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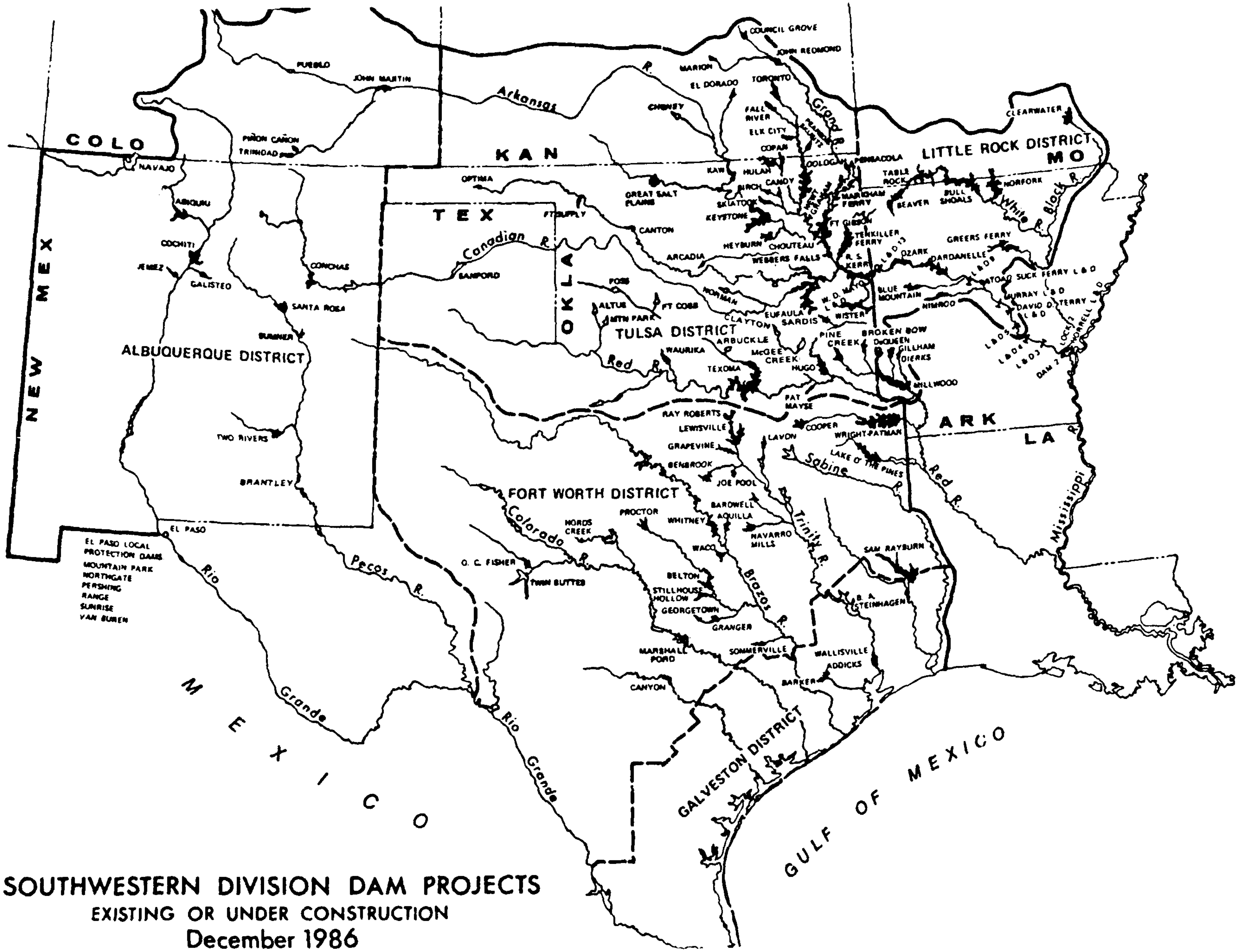
US Army Corps of Engineers
Southwestern Division
Reservoir Control Center

Annual Report 1990

January 1991

THE PACESETTER DIVISION



SOUTHWESTERN DIVISION DAM PROJECTS

EXISTING OR UNDER CONSTRUCTION

December 1986

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER
(NONE)

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle)
ANNUAL REPORT
1990
January 1991

5. TYPE OF REPORT & PERIOD COVERED
FINAL REPORT
FY 90 (1 Oct 89 - 1 Sep 90)

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)
Reservoir Control Center
Southwestern Division (Albuquerque, Fort Worth, Galveston, Little Rock, and Tulsa Districts)

8. CONTRACT OR GRANT NUMBER(s)

9. PERFORMING ORGANIZATION NAME AND ADDRESS
U.S. Army Corps of Engineers
Southwestern Division (CESWD-ED-WR)
1114 Commerce Street, Room 301
Dallas, TX 75242-0216

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS
Office, Chief of Engineers, U.S. Army
Washington, DC 20314-1000

12. REPORT DATE
January 1991

13. NUMBER OF PAGES
197

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)
U.S. Army Corps of Engineers
Southwestern Division (CESWD-ED-WR)
1114 Commerce Street, Room 301
Dallas, Texas 75242-0216

15. SECURITY CLASS. (of this report)
Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Available from:
Administrator, Defense Technical Information Center, ATTN: DTIC/DDA-2 Bldg. #5
Cameron Station, Alexandria, VA 22814

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

- Lake Regulation activities
- Regulation plans
- Water control manuals
- Water quality activities
- Sediment activities
- Data collection and management
- Water control automated data system

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report presents activities and accomplishments of the Southwestern Division (SWD) as related to reservoir regulation and water management activities for fiscal year 1990. Also presents detailed summaries of reservoir conditions, water quality activities, and coordinating activities with other Federal and non-Federal basin interests groups.

1990

ANNUAL REPORT

RESERVOIR CONTROL CENTER

SOUTHWESTERN DIVISION

PLATE

Dams and Reservoirs in the Southwestern Division — Inside Front Cover

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RESERVOIR CONTROL CENTER

1990 ANNUAL REPORT

SECTION I - INTRODUCTION

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1. <u>PURPOSE OF REPORT.</u> This report presents activities and accomplishments of the Southwestern Division (SWD) as related to reservoir regulation and water management activities throughout FY 1990. Detailed summaries of reservoir conditions, water quality activities, minutes of coordinating committee meetings and minutes of the 1990 Annual Reservoir Control Center meeting are also included.

This report is prepared in conformance with ER 1110-2-1400, 24 April 1970, Reservoir Control Centers, paragraph 12c.

2. <u>REFERENCE.</u> Reservoir Control Center (RCC) - SWD Guidance Memorandum, dated June 1971, approved by the Chief of Engineers as a general basis for the RCC's activities.

3. <u>OBJECTIVES OF THE RESERVOIR CONTROL CENTER.</u> The SWD RCC was established in 1967 by the Chief of Engineers to improve capabilities of the Corps of Engineers to perform its civil works mission as related to operation of reservoirs. The SWD RCC carries out its responsibilities by:

a. Organizing coordinating committees and/or participating in committees to accomplish mutual understanding among water interests regarding use and regulation of water resources.

b. Providing interbasin coordination of day-to-day regulation needs for river systems for all purposes.

c. Surveillance of daily operations and continuous analysis of project needs.

d. Furnishing technical assistance to personnel of District offices in related efforts to improve the reliability of regulations and hydrologic determinations.

e. Provide management and technical guidance for the development and operation of the Division-wide dedicated water control data system. This system includes the equipment and software used for the acquisition, transmission and processing of real-time hydrologic and meteorological data for the purpose of regulating projects for which the Corps of Engineers has responsibility.

SECTION II - WATER CONTROL ACTIVITIES IN SWD

SECTION II - WATER CONTROL ACTIVITIES IN SWD

1. RESERVOIR REGULATION

a. Lake Regulation During FY 90. Lake regulation activities for Division lakes and Section 7 lakes during FY 90 are summarized in Section VI of this report. Operational data summaries for all of the SWD projects, including Section 7, are shown in tabular form, Section VII. An index, by basin, to these tables is included which also lists pertinent data for each project. Also included is a listing in alphabetical order giving names of both the lake and dam where different.

b. System Studies - FY 90

(1) Brazos River Super Model - Fort Worth District. Hydrology is completed through 1986 and is ready for studies.

(2) White River Super Model - Little Rock District Reservoir Regulation. Forty-two additional simulations were made for the Little Rock Reservoir Regulation section in their attempt to develop a regulation plan to enhance farming along the White River.

(3) Red River Super Model - Tulsa. The Hydrology was updated through June, 1990. The total uncontrolled area flows were recomputed and checked. A new hydrology tape was built utilizing the updated flows, evaporation and precipitation data.

(4) Trinity River Super Model - Fort Worth District. Runs were made to calibrate the model and evaluate system operations. The Fort Worth Reservoir Control Center analyzed the results of the simulation runs and made modifications. Updated economic data was provided for the Dallas-Fort Worth Metro area. This model will be used for the Trinity River Regulation study.

(5) Arkansas River Super Model - Tulsa and Little Rock Districts. Two runs were made to evaluate the addition of two new hydropower units at Fort Gibson. These runs were the basis for ten mini-SUPER runs (described below).

(6) Broken Bow Fishery Simulations - Tulsa District. Studies were made to evaluate mandatory releases for a put and take trout fishery below Broken Bow Reservoir.

(7) Denison Restudy - Tulsa District. A study was made to determine the effects of pool manipulations on hydropower production. Also, a power study was made to determine the effect of a proposed new installation on the downstream fisheries.

(8) Arkansas River Mini-Super Runs - Tulsa District. Ten mini-SUPER runs were made as part of the turbine selection study on the addition of two new units at Fort Gibson Lake, Oklahoma.

c. Water Control Manuals. A summary entitled "Status of Water Control Manuals in SWD" is included in Section IV of this report. The summary gives the status and completion schedule through FY 1992 for manuals and plans for 118 lakes and 17 river systems and subsystems. Also shown in Section IV is a schedule for completion of high priority Water Control Plans for FY 91 through FY 96. At the end of FY 1990, there were 97 Corps of Engineers projects (80 lakes and 17 locks and dams) and 19 Section 7 lakes in operation in SWD.

During FY 1990, the SWD Reservoir Control Center received and reviewed 11 water control manuals that were submitted by the Districts. The schedule for FY 1991 includes the development of 8 new manuals and the revision of 17 existing manuals.

d. Drought Contingency Plans. A letter dated 8 June 1988 Subject; "Drought Contingency Plans (DCP)" renewed efforts within the Southwestern Division for the development of DCP's and provided additional guidance to supplement that contained in ER-1110-2-1941. This letter requested that DCP's be developed for all Corps projects with controlled reservoir storage and that the plans should only address temporary project modifications to satisfy short-term needs that can be implemented within existing authorities. During FY 88 several meetings were held in the SWD office with District personnel to develop a framework for DCP's, submittal schedules, review procedures, funding, etc. It was agreed that the DCP's would address individual projects. However, they would be developed on a river basin or sub-basin concept to include like projects. Each of the documented DCP's will become an appendix to the respective river basin Master Water Control Manual. A total of 23 DCP's will be developed for the river basins within the SWD. A table showing the river basin and projects within each basin is included in Section IV of this report. The table also shows a schedule for completion of the 23 DCP's. At the end of FY90 a plan has been submitted for review for each basin. All plans are expected to be approved by FY92.

e. Section 7 Project Regulation. Within SWD there are 19 existing Section 7 reservoirs owned and operated by other agencies. The flood control storage contained in these projects are regulated by the Corps in accordance with Section 7 of the Flood Control Act of 1944. The Districts are continuing their efforts to bring the manuals and regulation plans into compliance with requirements contained in paragraph 208.11, Part 208 Flood Control Regulations, Chapter 11, Title 33 of the Code of Federal Regulations (41 FR 20401, May 18. 1976). Due to the varied approaches between the Districts on real time regulation for Section 7 projects, SWDO issued a policy letter on 21 March 1983.

The purpose of the letter was to supersede previous SWDO guidance and to provide current policies on Section 7 projects. This letter and subsequent letters have been issued to the Districts requiring that policy on Section 7 projects be coordinated with project owners and that finalizing of water control manuals for existing projects should be expedited.

2. SOUTHWESTERN DIVISION WATER QUALITY PROGRAM AND ACTIVITIES.

a. Responsibilities. The Water Management Branch, Engineering Division is assigned the responsibilities to coordinate and direct activities within the Southwestern Division in the water quality field. This provides for water quality objectives being included as an effective part of our total water management program. Specific activities in the water quality program are as follows:

(1) Conduct technical studies and provide guidance on water quality control.

(2) Review and provide technical assistance in programs for predicting the natural and modified water quality in impoundments, rivers, coastal areas, and estuaries for project planning, design, and regulation activities.

(3) Review and provide technical assistance on project design and reservoir regulation studies in connection with water quality control performed within the Division, including multiple level outlet facilities, reservoir simulation studies, reregulation structures, and release reoxygenation systems.

(4) Provide coordination support in interagency liaison as related to water quality control through reservoir regulation including formulation of operating plans and cooperative data collection programs.

(5) Coordinate with Planning and Construction-Operations Divisions, and the Districts on SWD water quality investigation programs.

(6) In coordination with the Geotechnical and Materials Branch, manage the water quality investigation activities of the Division laboratory.

(7) Responsible for technical engineering solutions to water quality problems in existing projects: reviewing, coordinating, and acting as consultants to other engineering and planning elements in the Division office and District offices.

(8) Coordination of Division actions required by ER 1130-2-334 for reporting of water quality management of Corps projects.

b. ORGANIZATION.

(1) Division. Water quality activities in the Southwestern Division are coordinated within the Water Management Branch, Engineering Division. These duties require the part-time efforts of two engineers in the Water Management Branch, one biologist in Construction-Operations Division and a fisheries biologist in Planning Division. Mr. Charles Sullivan, Chief, Reservoir Control Center, is the SWD member on the HQUSACE Committee on Water Quality.

(2) Districts. The organizations for water quality management vary within the Districts. Water quality associated with planning and design of the projects is coordinated by organizational elements within the Engineering or Planning Divisions in all of the districts. Monitoring and reporting specifically required by ER 1130-2-334 and that required for dredging and other construction activities are done by the Construction, Operations, Engineering or Planning Divisions in the various districts depending on their capabilities.

(3) Laboratory. The Division laboratory is staffed and equipped to conduct water quality testing required by the Districts for use in planning, design, construction, and operation of the projects. However, because of location, costs and other factors most water quality testing by the Districts is contracted with private or other government laboratories.

c. Special Activities in FY 90.

(1) Southwestern Division Annual Water Quality Meeting. The Water Management Division of the Southwestern Division hosted an annual meeting of water quality interests in April 1990. This was the first such meeting in 8 years. Representatives from each district gave an overview of the water quality staff and functional areas handled in their district. Division representatives from Engineering, Construction-Operations and Planning Directorates presented information on their areas of responsibility, functions, capabilities and reporting requirements. District representatives discussed specific items including problems encountered at their projects. There was a good exchange of ideas on specific problems that was enjoyed by all attendees. We intend to hold similar meetings each year.

(2) Specific Project Problems. Water Quality related problems and activities at individual projects are discussed in the District reports. Other items in this section are highlights of activities.

(3) Water Quality Management Reports. Water quality management reports were completed for two additional projects in FY 89. Water quality management reports are now available on 22 SWD projects. Most of these reports are for Fort Worth District projects.

(4) Baseline Data. Baseline data acquisition was initiated at two additional SWD reservoir project in FY 90. As of the end of the year base line data has been obtained at over 40 reservoirs. Investigations are currently underway at 5 SWD projects. Our goal in this program is to develop a water quality data base for all SWD reservoir projects.

(5) Table Rock Dissolved Oxygen. The automatic oxygen injection system mentioned last year was completed at the end of the low disolved oxygen period and was only partially tested. The system was restarted this fall and was in operation briefly. Equipment failures have delayed full implimentation. It is anticipated that the system will be fully functional during October 1990. Studies by the Waterways Experiment Station (WES) recommend use of an in-lake hypolymnatic oxygen (hyp-ox) injection system to meet target dissolved oxygen levels in the hydropower releases. WES is currently doing preconstruction studies. Current schedule calls for report submission in early FY 91.

(6) Broken Bow Put-and Take Trout Fishery. Tulsa District is cooperating with the state of Oklahoma in a three year test of the feasibility of supporting a put-and-take trout fishery below Broken Bow Dam. This was the second year of the test. Minimum releases are made in addition to normal hydropower releases to sustain the fishery during the summer. The tests will be evaluated after next year.

d. Immediate Goals. The following actions have been scheduled for accomplishment in the near future:

(1) Continue the present intensive monitoring program for SWD reservoirs. This ongoing program will be continued until base line data are available for all SWD reservoirs.

(2) Review the basic water quality monitoring program.

e. Long-Term Goals. The following are presently considered as long-term continuous goals of this Division, and consequently the Water Management Division, in the water quality field.

(1) To obtain sufficient water quality information from all of our projects to determine whether all state standards and environmental objectives can be met without adverse impact on authorized uses.

(2) To promote the organization of effective water quality elements in the Division and Districts to obtain the maximum coordination for handling all water quality matters in the Division.

(3) To provide helpful and thorough guidance to the Districts on water quality matters.

3. SWD SEDIMENT PROGRAM AND ACTIVITIES. Sediment activities for the year included transfering all sediment programs and files from the Waterways Experiment Station Honeywell computer to the Tulsa District Water Control Data System Harris computer. We have been working on the SWD and WES Honeywell equipment for several years but that equipment is being phased out. The manufacturer's hydrographic survey system software has been replaced by an enhansed (more useable) system developed in the Tulsa District. The new software in addition to being much more 'user friendly' provides a greater hydrographic survey capability. Hydrographic surveys were conducted for Fall River and Toronto Lakes in Kansas, Lake Texoma in Oklahoma and Texas and Abiquiu Lake in New Mexico. The 247 sediment ranges on the main stem of the Arkansas River are re-surveved as near annually as funds and workload permit. During FY 90 111 ranges were scheduled for resurveying but only 43 were completed. Another 111 are scheduled for FY 91. These 43 ranges are the first resurveyed in the past 3 years. We have been unable to secure funding and manpower allocations to adequately conduct an effective Sediment investigations program in the Division. Several water supply contractors are interested in obtaining resurveys to determine the depletion rates of their water resources but we have not been able to secure the necessary funding.

4. DATA COLLECTION AND MANAGEMENT.

a. Stream Gaging Program. The reporting and measurement of flow, water quality and sediment data are required for regulation, investigation and design of water resources projects. Most of these data are obtained through a Cooperative Steam Gaging program between the Corps and the U.S. Geological Survey (USGS). During FY 1990 the SWD-USGS cooperative program contained 444 surface water stations, 47 water quality stations, and 47 suspended sediment stations. An additional 68 stations were operated independently by the District Corps offices. In FY 90, the total cost of the SWD program was $2.8 million with $2.6 million being transferred to the USGS. The following tabulation shows a breakdown of the program by class of funds used to finance the program.

Class of Funds	C of E Cost $1,000)
Survey Investigation	12
General Coverage	50
Planning	0
Operation & Maintenance	2,497
New Work & Construction	42
TOTAL:	2,601

b. Cooperative Reporting Networks. The National Weather Service (NWS) and the Corps of Engineers began their 53rd year of cooperation in establishing and operating networks of river

and/or rainfall reporting stations. Reports from these stations supplement those stations that are maintained by the NWS which are made available to the Corps of Engineers for flood control operations and flood forecasting. Data from these networks are transmitted to the Corps of Engineers District and Division offices via telephone and computer interface from the NWS collection office. A direct interface between the NWS computers located in the Fort Worth, Texas and Tulsa, Oklahoma NWS River Forecast Centers and the Corps Water Control Data System (WCDS) Harris carries hydrological reports, and other data essential to our water control management functions. These data include detailed precipitation reports, river stage information, warnings, descriptions of severe storms and floods, and river forecasts developed by the NWS. The RFC at Fort Worth has replaced their S/140 with a 386 PC. This has improved the service to SWD's Districts and Division Offices. Also, additional graphic products have been added to the current product list. These additions are mostly meteorological products. SWDO has also obtained a small computer which dials NWS radar sites for current radar images which can be stored for later viewing.

The estimated FY 1990 cost for SWD responsibilities in supporting 472 rainfall stations in the NWS Cooperative Reporting Networks was $267,880.

c. Water Control Data System. The "Water Control Data System Master Plan" for SWD, dated April 1979 was approved by the Office, Chief of Engineers in June 1979 for funding and detailed design. A "Water Control Data System Software Manual," dated February 1983 was developed as the system software design document.

In October 1988 HQUSACE organized a Corps work group to initiate formulation of a plan for an orderly migration from existing water control ADP equipment to future hardware. The first meeting of this work group to begin planning for the life-cycle replacement of the existing WCDS computers was held on 19-20 October 1988 in St Paul, MN. After this and a subsequent meeting of the group at Ft Belvoir on 14-15 February 1989 it was determined that the WCDS Master Plans would require updating to reflect the future requirements.

During FY89 SWD assembled a task group to update the SWD WCDS Master Plan to reflect the future needs of the WCDS. This task group consisted of a member from each of the five (5) district offices and the division office. The updated SWD Master Plan (dated December 1989) was completed and submitted to the Office of Chief of Engineers (OCE) on 16 January 1990.

(1) Communication.

(a) The Data Collection Platforms (DCP's) transmit the remote gaging station data over the Geostationary Orbiting Environmental Satellite (GOES) System. A Direct Readout Ground Receive Station (DRGS) is located at Fort Worth, Texas, for

receipt of the GOES transmission. The SWD DRGS was installed at the Federal Center in Fort Worth, Texas, in September 1983. This is a Synergetics Model 10C direct Readout Ground Receive Station equipped with 2 antennas (one for GOES east and one for GOES west). Both dial-up and direct line access is provided between the DRGS and the WCDS computers. In September 1988 the DRGS was transferred to the U. S. Geological Survey (USGS) in accordance with a Memorandum of Agreement between the Corps and the USGS. In accordance with the MOU the USGS will operate the DRGS and provide for the real-time transfer of GOES data to the Corps, plus backup support from other USGS DRGS.

(b) Transfer of National Weather Service (NWS) Automated Field Office Service (AFOS) data between the Corps and National Weather Service River Forecast Center computers is on a continuous basis via direct lines from both the Tulsa RFC and Fort Worth RFC.

(c) Communication between the District and Division data processing units is via the Division wide data communications network.

(2) Data Acquisition and Analysis.

(a) In June 1982, the RCC began using the Water Control Data System Computer (Harris 500) located in the Southwestern Division office, for computations that are necessary in the RCC's daily water control activities. Harris minicomputers were installed in the SWDO, Tulsa District, Fort Worth District, and Little Rock District offices as a part of the division wide Water Control Data System. The Albuquerque and Galveston Districts operate remotely from the computer located in SWDO.

(b) During FY 85 (as part of a Corps wide procurement contract) the original H-100 and H-500 computers were replaced by Harris 1000 computers at each of the four sites. The hardware at each site is compatible in order to allow the use of common software and data exchange between offices.

(c) A division wide data base is maintained on the SWDO machine and the other sites to maintain a data base applicable to the site. As part of the Continuity of Operations Plan (COOP) discussed later, the Ft. Worth data base contains data to provide back-up capability for the Dallas users and the Tulsa and Little Rock sites contain back-up for each other. The data bases at each District office are available to the Division office. The current data base uses the "TOTAL" data base management system and the SHEF code for data exchange with the National Weather Service. During FY 90, work continued on software development for analysis and display of the data.

(3) Data Display and Distribution. Data is displayed in individual offices with color graphic CRT's, PC's, plotters, and printers. Graphic applications programs utilize "TEMPLATE" software which is licensed by Megatek Corporation. Provisions

are made to exchange data with other water management cooperators. Examples of cooperative data exchange requirements are the Office of Chief Engineers, Lower Mississippi Valley Division (LMVD), National Weather Service, Southwestern Power Administration (SWPA), state and local river authorities or agencies. During the past year several routines for the display of information in a graphical format were upgraded. There also have been several routines developed for display of current project data and reports.

d. Cooperative Data Base and Forecasting Activity. The RCC continues to participate in and encourage the advancement of programs for automated data collection and interagency cooperation in forecasting activity and data base utilization. Currently, SWD maintains a data base on the WCDS for Daily Generation reports, and daily River Reports. These data bases are updated daily and the data are maintained until the end of the month then used for monthly summaries. These data, with several District auxiliary programs and data bases, have been used to make forecasts and reports available for exchange as needed between the Districts and SWDO. In addition, the data are made available to other users which have a need to be aware of the water control activities.

e. Continuity of Operations Plan (COOP). A draft COOP for the Southwestern Division Water Control Data System has been developed. This plan outlines procedures for providing back up capability in the event of an equipment failure at any one of the computer sites in the SWD WCDS. The general scheme of the plan is for each site to have a designated back-up site which maintains a current data base and software which will support the site in the event of a computer failure. The plan was implemented at least twice during the May 1990 flood.

f. Inland Water Resources Remote Sensing Demonstration Program. SWD serves as a working group member for this five (5) year program which began in FY86 and ended in FY90. The Inland Water Resources Remote Sensing Demonstration Program is a cooperative project between the Cold Regions Research and Engineering Laboratory (CRREL) and the Rock Island District. One objective of the program is to demonstrate the use of in-situ, aircraft, and satellite remote sensing data in the Corps water resource mission area. Comparisons of information content, reliability, the cost of acquiring and analyzing remote sensing data, and the integration of remotely sensed data into the WCDS are being addressed in the study.

Specific remote sensing technology applications are being demonstrated for several Rock Island District functions. These include evaluating sensors that acquire real-time data about environmental, hydrologic and geotechnical parameters for determining dam and levee structural integrity; collecting water control data for navigation, reservoir regulation, basin hydrologic

monitoring and model validation; monitoring water quality for dredging, hydropower and reservoir regulation; and developing a spatial data base for use in real-time flood forecasting models.

g. Rainfall forecasting. The National Weather Services Next Generation Weather Radar(NEXRAD) will be installed during the period 1991-1995. NEXRAD will provide SWD with timely rainfall reports which will be included in the SWD data base and can be used in running forecast models.

5. COORDINATION WITH WATER MANAGEMENT INTERESTS.

a. General. The benefits deriving from personal contact with other persons associated with water management activities are well recognized by the RCC. For this reason, special emphasis has been placed on maintaining this personal contact through meetings and workshops sponsored by the Districts and the RCC with the marketing agency, project personnel, river basin authorities, other Divisions, the Chief's office and others.

(1) The Hydrologic Engineering Section and the Hydraulics Section (other sections in the Water Management Branch) furnish support to the RCC. The Hydrologic Engineering Section conducts systems studies of Reservoir Regulation and the Hydraulics Section reviews studies on sediment and water quality activities.

(2) A meeting of Reservoir Control personnel of each of the Districts is held annually by the Division Reservoir Control Center for the purpose of discussing timely topics and exchanging information. This year the RCC meeting was held in the Division office. The minutes of the RCC Annual Meeting held on 31 October and 1 November 1990 are included in Section VIII.

b. Agency coordination.

(1) Arkansas River Basin Coordinating Committee. After being inactive since the 30 April 1982 meeting in Little Rock, Arkansas the committee was re-established in connection with the notification of adoption of the "1986 Arkansas River Water Control System Operation Plan." The notification for the plan was issued on 17 June 1986 with the plan becoming effective on 1 July 1986. The fourth meeting of the re-established committee was held in Dallas on 28 June 1990. At this meeting it was agreed to hold another meeting in the Spring of 1991. The minutes of the meeting are included in section VIII.

MEETINGS OF THE RE-ESTABLISHED
ARKANSAS COORDINATING COMMITTEE

Meeting	Date
1	28 Jan 1987
2	6 Jun 1988
3	12 May 1989
4	28 Jun 1990

(2) Cooperation with Lower Mississippi Valley Division. The SWD RCC continues its cooperation with LMVD and provides observed, as well as forecasted data, that are significant to the water management activities in LMVD.

(3) Cooperation with Southwestern Power Administration. The SWPA is an agency of the United States, established in the Department of Energy, to execute the purposes of the Flood Control Act of 1944 with respect to the disposition of the electric power and energy made available from the reservoir projects under control of the Department of the Army in the area comprising all of Arkansas and Louisiana and portions of Missouri, Kansas, Texas, and Oklahoma. The scheduling of releases for hydropower production from the 17 Corps of Engineers projects within SWD has a significant effect on the overall water management activities in the Division. Therefore, close cooperation and continuous communication between the Corps and SWPA are mandatory. A Memorandum of Understanding was signed by the SWPA and the Corps of Engineers in 1980. SWPA and SWD have proceeded to develop a draft detail Operating Arrangement to assist in the operations of hydropower projects within SWD. SWD has formally informed the SWPA that the draft document would be its policy for coordinating operations with them until such time that both agencies have signed the arrangement. Specific activities included in the Operating Arrangement for cooperation between SWPA and RCC are monthly scheduling of power production, preparation of data for reports to the Federal Energy Regulatory Commission (FERC), and daily coordination of routine data on current conditions, inflow forecasts, and release schedules. The RCC has taken every opportunity to improve and strengthen relations with SWPA through correspondence, regularly scheduled and special meetings, providing access to our computer systems, and by special studies aimed at improving energy production and scheduling at SWD power projects.

(4) National Weather Service. A NWS Interagency Support Agreement was signed by General Lee on 17 July 1988 for hydrometeorological services for the Southwestern Division. The agreement provides that a full time NWS meteorologist be assigned to the Reservoir Control Center. The position was filled on 1 Jan 1989.

The NWS to COE transfer of AFOS products has continued during the year via the RFC Fort Worth and RFC Tulsa S140 computers. Near the end of the year software was completed which allows the transfer of AFOS products through a Compaq 386 PC instead of the S140. Use of the Compaq and a higher line speed allows throughput of a larger number of graphics products than was possible with the S140. The NWS also has plans to replace the S140 with a Compaq 386 at the Tulsa RFC.

(5) Tri-Agency NEXRAD Group. The Southwestern Division was appointed the lead Division by OCE at a meeting on 1 Jun 89 for the technical development of the Next Generation Weather Radar (NEXRAD) for Corps of Engineers needs. To this end, funds were transferred on 15 August 1990 to the Joint System Program Office (JSPO) to pay for communication ports on 133 NEXRAD radar product generators (RPG's). The Tulsa District issued a contract to Horizons Technology, Inc. (HTI) in mid July for development of software for a Principal User Processor Interactive Emulator (PUPIE). One of the stipulations in the contract was for HTI to have access to an RPG port at Norman, OK for testing the communications and software. This has been delayed due to hardware and software problems at the Normal site. Therefore, the contract with HTI has been modified with a completion date 45 days after access to the RPG port is granted. The first part of the HTI contract is for software to connect to the NEXRAD RPG and retrieve the digital data. This digital data can then be input to hydrologic models at the districts. The cost for this development is $89,000. The second part of the contract with HTI is to take the digital data at the Corps office and change it to a graphic product with overlays, time lapse, etc. to be displayed on a personal computer. The cost for this development will be approximately $114,000. This represents additional funds that will be needed in FY91. The Tri-Agency communications working group expects to issue a request for proposal (RFP) to industry by March 91 for a communications service for NEXRAD.

Section III - FACILITIES AND PERSONNEL

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1. Facilities.

a. Office Space. SWDO personnel occupies quarters on the third floor in the Sante Fe Building, 1114 Commerce Street, Dallas. Texas. Space occupied by the RCC includes an open-space working area, and an equipment room.

b. Display Facilities. All of the display equipment used for conferences and for briefings of higher authorities are located in the Engineering Directorate conference room. This room has limited space and equipment; but, it does include chalkboards, white metal panel adequate for use of markers, portable projection equipment, a video tape recorder, a projection screen, and a Barco Data 600 large screen display unit driven by an IBM-AT Personal computer.

c. Communications Equipment. The equipment room contains a multiplexor, two dot-matrix hard-copy TTY terminals, one letter quality terminal, a Tektronix color printer, IBM-AT which is used to drive the large screen display, Sony color monitor with VTR and an Alden Color Radar system. Two file servers (Compaq PC's) have been installed in this room. The Tektronix color printer, a dot-matrix hard-copy TTY terminal, the letter quality terminal and two Epsom printers have been connected to these file servers. This gives personnel in Water Management Division access to all of these printers. The Sony color monitor is used to monitor and record weather and news events on the Cable News Network, Weather Channel, and local TV stations. The Alden Color Radar system is used to monitor and record radar images from National Weather Service radars within SWD and along the Gulf Coast.

2. Personnel.

a. Staff. The authorized staff of the RCC consists of one supervisory hydraulic engineer, two hydraulic engineers, one hydrologic technician, and one meteorologist (NWS employeee). The RCC is supported in technical studies by the Hydrologic Engineering and the Hydraulics Sections. The current organization chart for the SWD Water Management Branch is shown in figure 1.

b. Training. The RCC periodically assesses the training needs of its personnel and schedules that training which is required and possible. Mr. Ralph Garland participated in the HQUSACE Professional Development Assignment Program from 7 May - 7 September 1990. He was assigned to the Hydraulic & Hydrology Branch, Engineering Division, Civil Works Directorate.

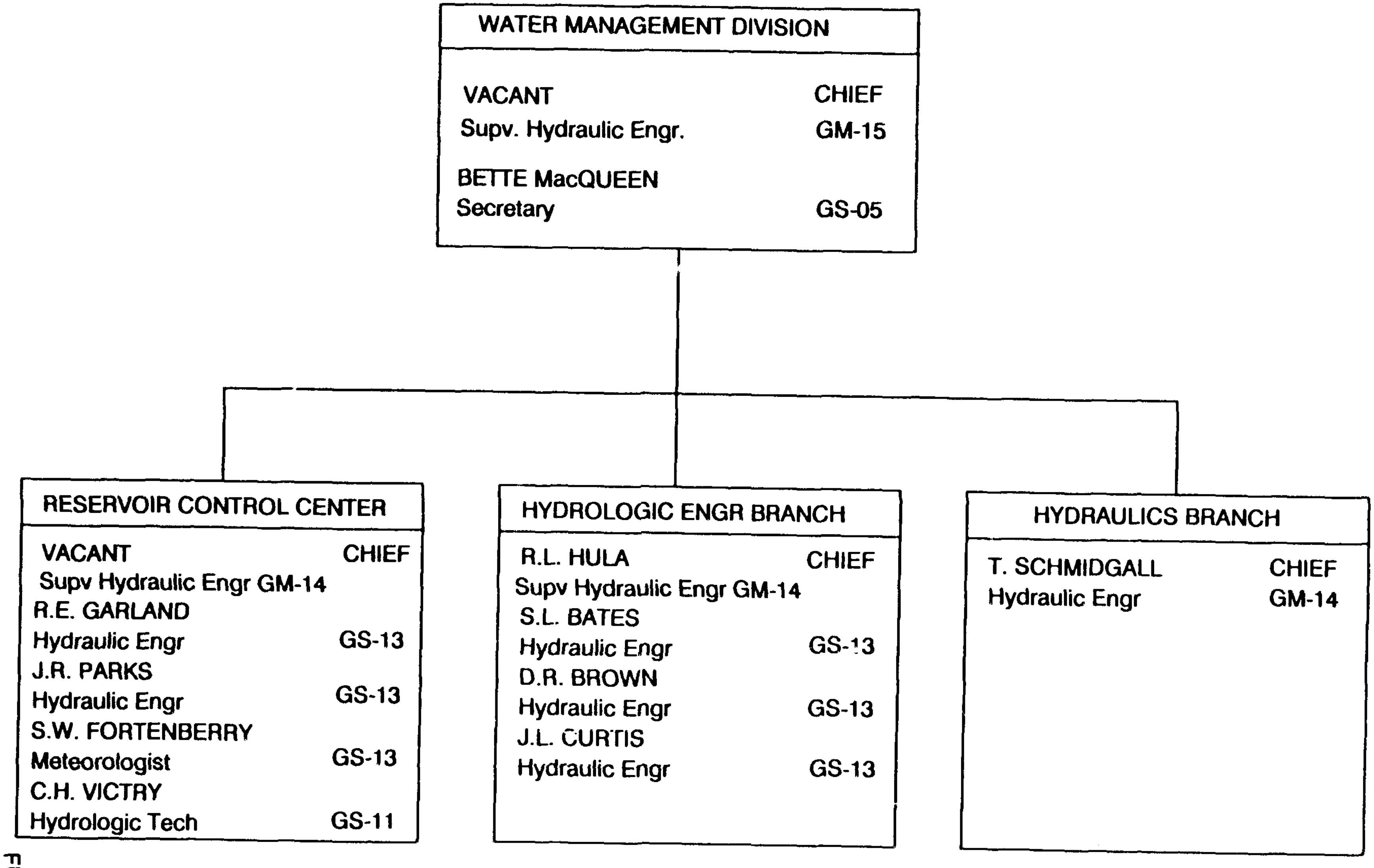

WATER MANAGEMENT DIVISION
VACANT CHIEF
Supv. Hydraulic Engr. GM-15
BETTE MacQUEEN
Secretary GS-05
RESERVOIR CONTROL CENTER
VACANT CHIEF
Supv Hydraulic Engr GM-14
R.E. GARLAND
Hydraulic Engr GS-13
J.R. PARKS
Hydraulic Engr GS-13
S.W. FORTENBERRY
Meteorologist GS-13
C.H. VICTRY
Hydrologic Tech GS-11
HYDROLOGIC ENGR BRANCH
R.L. HULA CHIEF
Supv Hydraulic Engr GM-14
S.L. BATES
Hydraulic Engr GS-13
D.R. BROWN
Hydraulic Engr GS-13
J.L. CURTIS
Hydraulic Engr GS-13
HYDRAULICS BRANCH
T. SCHMIDGALL CHIEF
Hydraulic Engr GM-14

FIGURE 1

SECTION IV

STATUS OF WATER CONTROL MANUALS AND DROUGHT CONTINGENCY PLANS

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16)
Revised: January 1991

RESERVOIR	STREAM	OWNER	DIST	APPROVED			SCHEDULED THRU FY 93	
WHITE RIV MASTER		CE	LRD	DEC 55	OCE	F	SEP 91	U
BEAVER	WHITE RIV BASIN	CE	LRD	JAN 67	OCE	F		
TABLE ROCK	WHITE RIV BASIN	CE	LRD	JAN 67	OCE	F	SEP 93	U
BULL SHOALS	WHITE RIVER BASIN	CE	LRD	JAN 67	OCE	F	SEP 93	U
NORFORK	WHITE RIVER BASIN	CE	LRD	JAN 67	OCE	F		
CLEARWATER	BLACK RIVER	CE	LRD	FEB 73	SWD	R*	SEP 92	U
GREERS FERRY	LITTLE RED RIVER	CE	LRD	JUN 66	OCE	F		
ARKANSAS MASTER		CE	AD	JUN 70	OCE	F		
PUEBLO (1)	ARKANSAS RIVER	BR	AD	JUN 84	SWD	F		
TRINIDAD	PURGATORIE RIVER	CE	AD	SEP 85	SWD	F		
JOHN MARTIN	ARKANSAS RIVER	CE	AD	JAN 83	SWD	AR		
ARKANSAS MASTER		CE	TD	OCT 80	SWD	F		
CHENEY (1)	N.F.NINNESCAH	BR	TD	MAR 66	OCE	AR		
EL DORADO	WALNUT RIVER	CE	TD	FEB 83	SWD	F		
KAW	ARKANSAS RIVER	CE	TD	JAN 78	SWD	F	JAN 92	U
GREAT SALT PLAINS	SALT FORK ARK	CE	TD	AUG 71	SWD	F	JAN 94	U
KEYSTONE	ARKANSAS RIVER	CE	TD	JAN 90	SWD	F		
HEYBURN	POLECAT CREEK	CE	TD	DEC 84	SWD	F		
VERDIGRIS SYSTEM								
TORONTO	VERDIGRIS RIVER	CE	TD	JAN 89	SWD	F		
FALL RIVER	FALL RIVER	CE	TD	AUG 66	OCE	F	AUG 91	U
ELK CITY	ELK RIVER	CE	TD	AUG 66	OCE	F	JAN 94	U
PEARSON-SKUBITZ-BIG HILL	BIG HILL CREEK	CE	TD	APR 83	SWD	F		
OOLOGAH	VERDIGRIS RIVER	CE	TD	JUL 76	SWD	F	JAN 92	U
COPAN	CANEY RIVER	CE	TD	MAR 83	SWD	F		
HULAH	CANEY RIVER	CE	TD	JUN 69	OCE	AR	JAN 91	U
BIRCH	BIRD CREEK	CE	TD	SEP 81	SWD	F		
SKIATOOK	HOMINY CREEK	CE	TD	DEC 84	SWD	F		
GRAND SYSTEM								
COUNCIL GROVE	NEOSHO RIVER	CE	TD	MAY 74	SWD	F		
MARION	COTTONWOOD RIVER	CE	TD	AUG 74	SWD	F		
JOHN REDMOND	NEOSHO RIVER	CE	TD				DEC 93	
PENSACOLA (1)	NEOSHO RIVER	GRDA	TD	MAR 65	OCE	AR	JUL 91	U
MARKHAM FERRY (1)	NEOSHO RIVER	GRDA	TD	MAR 65	OCE	AR	MAY 92	U
FORT GIBSON	NEOSHO RIVER	CE	TD	MAR 65	OCE	AR	JUL 92	U
TENKILLER FERRY	ILLINOIS RIVER	CE	TD	MAR 77	SWD	F		

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16)
Revised: January 1991

RESERVOIR	STREAM	OWNER	DIST	APPROVED			SCHEDULED THRU FY 93	
CANADIAN SYSTEM								
CONCHAS	CANADIAN RIVER	CE	AD	JAN 68	OCE	F		
SANFORD (1)	CANADIAN RIVER	BR	TD	FEB 66	OCE	AR		
NORMAN (1)	LITTLE RIVER	BR	TD	DEC 65	OCE	F	DEC 94	U
OPTIMA	N. CANADIAN RIVER	CE	TD	JAN 72	SWD	F		
FORT SUPPLY	WOLF CREEK	CE	TD	JAN 72	SWD	F		
CANTON	N. CANADIAN RIVER	CE	TD	JAN 72	SWD	F		
ARCADIA	DEEP FORK RIVER	CE	TD	JUN 86	SWD	F		
EUFAULA	CANADIAN RIVER	CE	TD	NOV 63	OCE	F	OCT 92	U
NEWT GRAHAM PT VI, L&D 18	ARKANSAS RIVER	CE	TD	AUG 72	SWD	F		
CHOUTEAU PT V, L&D 17	ARKANSAS RIVER	CE	TD	AUG 72	SWD	F		
WEBBERS FALLS PT IV,L&D 16	ARKANSAS RIVER	CE	TD	JUN 72	SWD	F		
R.S. KERR PT III, L&D 15	ARKANSAS RIVER	CE	TD	APR 72	SWD	F		
W.D. MAYO PT II, L&D 14	ARKANSAS RIVER	CE	TD	FEB 73	SWD	F		
WISTER	POTEAU RIVER	CE	TD	JUN 74	SWD	F		
BLUE MOUNTAIN	PETIT JEAN	CE	LRD	MAR 68	OCE	F		
NIMROD	FOURCHE LA FAVE	CE	LRD	MAR 68	OCE	F		
LOCK & DAM 13	ARKANSAS RIVER	CE	LRD	SEP 74	SWD	F	SEP 91	U
OZARK-JETA TAYLOR	ARKANSAS RIVER	CE	LRD	SEP 74	SWD	F		
DARDANELLE	ARKANSAS RIVER	CE	LRD	APR 76	SWD	F		
LOCK & DAM 9	ARKANSAS RIVER	CE	LRD	APR 76	SWD	F	SEP 93	U
LOCK & DAM 8 TOAD SUCK FERRY	ARKANSAS RIVER	CE	LRD	AUG 74	SWD	F		
LOCK & DAM 7 MURRAY	ARKANSAS RIVER	CE	LRD	AUG 74	SWD	F	DEC 91	U
LOCK & DAM 6 DAVID D. TERRY	ARKANSAS RIVER	CE	LRD	SEP 74	SWD	F		
LOCK & DAM 5	ARKANSAS RIVER	CE	LRD	SEP 74	SWD	F		
LOCK & DAM 4	ARKANSAS RIVER	CE	LRD	SEP 74	SWD	F		
LOCK & DAM 3	ARKANSAS RIVER	CE	LRD	SEP 74	SWD	F		
LOCK & DAM 2	ARKANSAS RIVER	CE	LRD	SEP 74	SWD	F		
LOCK & DAM 1 (ARK POST CANAL)	ARKANSAS RIVER	CE	LRD	SEP 74	SWD	F		
RED RIVER MASTER		CE	TD	FEB 63	OCE	AR		
ALTUS (1)	N. FORK RED	BR	TD	OCT 68	OCE	F	OCT 91	U
MOUNTAIN PARK (1)	OTTER CREEK	BR	TD	MAR 76	SWD	R*	OCT 93	
TRUSCOTT BRINE LAKE	BLUFF CREEK	CE	TD					
LAKE KEMP (1)	WICHITA RIVER	WCID	TD	JUN 73	SWD	F		
WAURIKA	BEAVER CREEK	CE	TD	APR 77	SWD	F		
FOSS (1)	WASHITA RIVER	BR	TD	MAY 61	OCE	F	SEP 92	U
FORT COBB (1)	COBB CREEK	BR	TD	MAR 61	OCE	F		
ARBUCKLE (1)	ROCK CREEK	BR	TD	SEP 67	OCE	AR		
TEXOMA	RED RIVER	CE	TD	SEP 82	SWD	F	DEC 92	U
PAT MAYSE	SANDERS CREEK	CE	TD	OCT 67	OCE	F		
SARDIS	JACKFORK CREEK	CE	TD	AUG 84	SWD	F		
MCGEE CREEK (1)	MUDDY BOGGY CREEK	BR	TD	OCT 89	SWD	F		
HUGO	KIAMICHI RIVER	CE	TD	JUL 82	SWD	AR		

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16)
Revised: January 1991

RESERVOIR	STREAM	OWNER	DIST	APPROVED			SCHEDULED THRU FY 93	
LITTLE RIV SYS								
PINE CREEK	LITTLE RIVER	CE	TD	JUL 74	SWD	AR		
BROKEN BOW	MOUNTAIN FORK	CE	TD	NOV 74	SWD	F		
DEQUEEN	ROLLING FORK	CE	LRD	JUN 76	SWD	R		
GILLHAM	COSSATOT RIVER	CE	LRD	JUL 86	SWD	F		
DIERKS	SALINE RIVER	CE	LRD	AUG 75	SWD	F		
MILLWOOD	LITTLE RIVER	CE	LRD	NOV 73	SWD	F		
SULPHUR RIV MASTER								
COOPER	SULPHUR RIVER	CE	FWD				SEP 93	
WRIGHT PATMAN	SULPHUR RIVER	CE	FWD	NOV 74	LMVD	F		
LAKE O' THE PINES	CYPRESS CREEK	CE	FWD	NOV 74	LMVD	F		
NECHES RIV MASTER		CE	FWD	MAR 63	OCE	AR		
B. A. STEINHAGEN	NECHES RIVER	CE	FWD	FEB 63	OCE	AR		
SAM RAYBURN	ANGELINA RIVER	CE	FWD	FEB 73	SWD	AR		
TRINITY RIV MASTER		CE	FWD	MAY 75	SWD	P	SEP 92	
BENBROOK	CLEAR FORK	CE	FWD	MAY 75	SWD	P		
JOE POOL	MOUNTAIN CREEK	CE	FWD	JAN 86	SWD	P/AR	SEP 92	
RAY ROBERTS	ELM FORK	CE	FWD	JAN 86	SWD	P/AR	SEP 91	R
LEWISVILLE	ELM FORK	CE	FWD	MAY 75	SWD	P	SEP 91	
GRAPEVINE	DENTON CREEK	CE	FWD	MAY 75	SWD	P	SEP 91	
LAVON	EAST FORK	CE	FWD	MAY 75	SWD	P	SEP 93	
NAVARRO MILLS	RICHLAND CREEK	CE	FWD	JUL 64	OCE	AR	SEP 92	R
BARDWELL	WAXAHACIE CREEK	CE	FWD	JUL 65	OCE	AR	SEP 91	R
WALLISVILLE	TRINITY RIVER	CE	GD					
BUFFALO BAYOU MASTER		CE	GD					
BARKER	BUFFALO BAYOU	CE	GD	OCT 72	SWD	F	JUN 93	R
ADDICKS	BUFFALO BAYOU	CE	GD	OCT 72	SWD	F	JUN 93	R
BRAZOS RIV MASTER		CE	FWD	MAR 73	SWD	R*		
WHITNEY	BRAZOS RIVER	CE	FWD	MAY 75	SWD	F		
AQUILLA	AQUILLA CREEK	CE	FWD	JUL 88	SWD	F		
PROCTOR	LEON RIVER	CE	FWD	APR 74	SWD	F	SEP 93	U
BELTON	LEON RIVER	CE	FWD	MAY 76	SWD	F		
STILLHOUSE HOLLOW	LAMPASAS RIVER	CE	FWD	FEB 79	SWD	F		
GEORGETOWN	N.F.SAN GABRIEL	CE	FWD	JUN 90	SWD	F		
GRANGER	SAN GABRIEL	CE	FWD	NOV82	SWD	R	SEP 91	R
WACO	BOSQUE RIVER	CE	FWD	AUG 73	SWD	F		
SOMERVILLE	YEGUA CREEK	CE	FWD	NOV 73	SWD	F		

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16)
Revised: January 1991

RESERVOIR	STREAM	OWNER	DIST	APPROVED			SCHEDULED THRU FY 93	
COLORADO RIV MASTER		CE	FWD					
HORDS CREEK	HORDS CREEK	CE	FWD	MAY 62	OCE	AR		
O.C. FISHER	N. CONCHO	CE	FWD	DEC 62	OCE	AR		
TWIN BUTTES (1)	S. CONCHO	BR	FWD	SEP 66	OCE	P/FR	SEP 92	
MARSHALL FORD (1)	COLORADO RIVER	BR	FWD	MAY 80	SWD	P/FR	SEP 92	
GUADALUPE RIV MASTER		CE	FWD	JAN 66	OCE	AR		
CANYON	GUADALUPE RIVER	CE	FWD	MAY 73	SWD	F		
RIO GRANDE MASTER		CE	AD	FEB 67	OCE	F		
ABIQUIU	RIO CHAMA	CE	AD	JUN 82	SWD	F	APR 91	U
COCHITI	RIO GRANDE	CE	AD	JUN 81	SWD	F	MAR 91	U
GALISTEO	GALISTEO CREEK	CE	AD	APR 68	OCE	F	APR 93	U
JEMEZ CANYON	JEMEZ RIVER	CE	AD	AUG 84	SWD	F	AUG 92	U
PLATORO (1)	CONEJOS RIVER	BR	AD	MAY 64	OCE	F	JAN 92	U
PECOS RIV MASTER		CE	AD	NOV 77	SWD	AR		
SANTA ROSA	PECOS RIVER	CE	AD	SEP 81	SWD	F		
SUMNER (1)	PECOS RIVER	BR	AD	JUL 84	SWD	AR	OCT 90	U
TWO RIVERS	RIO HONDO	CE	AD	JUN 64	OCE	F	FEB 93	U
BRANTLEY (1)	PECOS RIVER	CE	AD	JUL 90	SWD	F		
NAVAJO (1)	SAN JUAN RIVER	BR	AD	JUN 70	OCE	F	JUN 91	U

NOTES:
(1) = Section 7 project, flood control regulation by CE.
AR = Approved, comments to be answered.
F = Complete, comments have been answered and approved.
FR = Published in Federal Register.
P = Plan.
R = Revision or answer to comments.
R* = Returned without approval.
U = Update of existing approved manual.
GRDA = Grand River Dam Authority.
WCID = Wichita County Water Improvement District.
LCRA = Lower Colorado River Authority.
BR = Bureau of Reclamation.

SOUTHWESTERN DIVISION
SCHEDULE OF HIGH PRIORITY WATER CONTROL PLANS
FY 91 THRU FY 96

	DISTRICT				
FY	ALBUQUERQUE	FORT WORTH	GALVESTON	LITTLE ROCK	TULSA
91	COCHITI	BARDWELL		WHITE RIVER MST	HULAH
	SUMNER	RAY ROBERTS		L & D #13	ALTUS
	ABIQUIU	GRAPEVINE		L & D #7	FALL RIVER
	NAVAJO	GRANGER			
		LEWISVILLE			
92	PLATORA	TRINITY MSTR		CLEARWATER	KAW
	JEMEZ CANYON	TWIN BUTTES			OOLOGAH
		NAVARRO MILLS			HUDSON
		JOE POOL			FT GIBSON
		MARSHALL FORD			FOSS
					EUFAULA
93	GALISTEO	COOPER	ADDICKS	BULL SHOALS	TOM STEED
	TWO RIVERS	LAVON	BARKER	TABLE ROCK	TEXOMA
		PROCTOR			
94	CONCHAS	BENBROOK		GREERS FERRY	THUNDERBIRD
	RIO GRANDE MSTR	NECHES RIV MSTR		L & D #9	G.S. PLAINS
		BRAZOS MSTR			ELK CITY
95	JOHN MARTIN	WHITNEY		BEAVER	RED MASTER
	PECOS MSTR	GUADALUPE MSTR		NORFORK	CHENEY
					MARION
					COUNCIL GROVE
					FT COBB
96	PUEBLO	WACO		BLUE MTN.	TENKILLER
	TRINIDAD	BELTON			JOHN REDMOND
					WISTER
					CANTON

'Revised JANUARY 1991
SCH91-96

SCHEDULE OF DROUGHT CONTINGENCY PLANS IN SWD

JANUARY 1991

BASIN/PROJECT	STREAM	DIST	SCHEDULED COMPLETION DATE	STATUS/DATE
WHITE RIV BASIN		LRD	AUGUST 1990	APPROVED PLAN/SEP 89
BEAVER	WHITE RIVER	LRD		
TABLE ROCK	WHITE RIVER	LRD		
BULL SHOALS	WHITE RIVER	LRD		
NORFORK	WHITE RIVER	LRD		
CLEARWATER	BLACK RIVER	LRD		
GREERS FERRY	LITTLE RED RIVER	LRD		
UPPER ARKANSAS RIVER BASIN		AD	AUGUST 1989	APPROVED PLAN/APR 90
TRINIDAD	PURGATORIE RIVER	AD		
JOHN MARTIN	ARKANSAS RIVER	AD		
MID-ARKANSAS RIVER BASIN		TD	DECEMBER 1990	DRAFT PLAN/MAY 90
EL DORADO	WALNUT RIVER	TD		
KAW	ARKANSAS RIVER	TD		
GREAT SALT PLAINS	SALT FORK ARK	TD		
KEYSTONE	ARKANSAS RIVER	TD		
HEYBURN	POLECAT CREEK	TD		
UPPER VERDIGRIS RIVER BASIN		TD	JULY 1990	APPROVED PLAN/AUG 90
TORONTO	VERDIGRIS RIVER	TD		
FALL RIVER	FALL RIVER	TD		
ELK CITY	ELK RIVER	TD		
PEARSON-SKUBITZ-BIG HILL	BIG HILL CREEK	TD		
LOWER VERDIGRIS RIVER BASIN		TD	MARCH 1990	APPROVED PLAN/AUG 90
COPAN	CANEY RIVER	TD		
HULAH	CANEY RIVER	TD		
BIRCH	BIRD CREEK	TD		
SKIATOOK	HOMINY CREEK	TD		
OOLOGAH	VERDIGRIS RIVER	TD		
UPPER NEOSHO RIVER BASIN		TD	AUGUST 1989	APPROVED PLAN/OCT 90
COUNCIL GROVE	NEOSHO RIVER	TD		
MARION	COTTONWOOD RIVER	TD		
JOHN REDMOND	NEOSHO RIVER	TD		
LOWER ARK RIVER BASIN		TD	AUGUST 1989	APPROVED PLAN/AUG 90
FORT GIBSON	NEOSHO RIVER	TD		
TENKILLER FERRY	ILLINOIS RIVER	TD		
WISTER	POTEAU RIVER	TD		

SCHEDULE OF DROUGHT CONTINGENCY PLANS IN SWD

JANUARY 1991

BASIN/PROJECT	STREAM	DIST	SCHEDULED COMPLETION DATE	STATUS/DATE
UPPER CANADIAN RIVER BASIN		AD	MARCH 1990	FINAL PLAN/MAY 90
CONCHAS	CANADIAN RIVER	AD		
LOWER CANADIAN RIVER BASIN		TD	JULY 1990	DRAFT PLAN/MAR 90
OPTIMA	N. CANADIAN RIVER	TD		
FORT SUPPLY	WOLF CREEK			
CANTON	N. CANADIAN RIVER	TD		
ARCADIA	DEEP FORK RIVER	TD		
EUFAULA	CANADIAN RIVER	TD		
NAVIGATION PROJECTS		TD	DECEMBER 1990	DRAFT PLAN/JUL 90
NEWT GRAHAM, L&D 18	ARKANSAS RIVER	TD		
CHOUTEAU,L&D 17	ARKANSAS RIVER	TD		
WEBBERS FALLS,L&D 16	ARKANSAS RIVER	TD		
R.S. KERR,L&D 15	ARKANSAS RIVER	TD		
W.D. MAYO,L&D 14	ARKANSAS RIVER	TD		
LOWER ARKANSAS RIVER BASIN		LRD	MARCH 1990	DRAFT PLAN/DEC 89
BLUE MOUNTAIN	PETIT JEAN	LRD		
NIMROD	FOURCHE LA FAVE	LRD		
OZARK-JETA TAYLOR	ARKANSAS RIVER	LRD		
DARDANELLE	ARKANSAS RIVER	LRD		
NAVIGATION L&D'S(10)	ARKANSAS RIVER	LRD		
UPPER RED RIVER BASIN		TD	MARCH 1990	FINAL PLAN/AUG 89
TEXOMA	RED RIVER	TD		
WAURIKA	BEAVER CREEK	TD		
MID-RED RIVER BASIN		TD	JULY 1990	FINAL PLAN/JAN 90
PAT MAYSE	SANDERS CREEK	TD		
SARDIS	JACKFORK CREEK	TD		
HUGO	KIAMICHI RIVER	TD		
PINE CREEK	LITTLE RIVER	TD		
BROKEN BOW	MOUNTAIN FORK	TD		
LITTLE RIVER BASIN		TD	NOVEMBER 1990	FINAL PLAN/NOV 89
DEQUEEN	ROLLING FORK	LRD		
GILLHAM	COSSATOT RIVER	LRD		
DIERKS	SALINE RIVER	LRD		
MILLWOOD	LITTLE RIVER	LRD		

SCHEDULE OF DROUGHT CONTINGENCY PLANS IN SWD

JANUARY 1991

BASIN/PROJECT	STREAM	DIST	SCHEDULED COMPLETION DATE	STATUS/DATE
LOWER RED RIVER BASIN		FWD	AUGUST 1990	FINAL PLAN/FEB 90
COOPER	SULPHUR RIVER	FWD		
WRIGHT PATMAN	SULPHUR RIVER	FWD		
LAKE O' THE PINES	CYPRESS CREEK	FWD		
NECHES RIV BASIN		FWD	FEBRUARY 1991	DRAFT PLAN/DEC 89
B. A. STEINHAGEN	NECHES RIVER	FWD		
SAM RAYBURN	ANGELINA RIVER	FWD		
TRINITY RIV BASIN		FWD	AUGUST 1989	FINAL PLAN/AUG 89
BENBROOK	CLEAR FORK	FWD		
JOE POOL	MOUNTAIN CREEK	FWD		
RAY ROBERTS	ELM FORK	FWD		
LEWISVILLE	ELM FORK	FWD		
GRAPEVINE	DENTON CREEK	FWD		
LAVON	EAST FORK	FWD		
NAVARRO MILLS	RICHLAND CREEK	FWD		
BARDWELL	WAXAHACIE CREEK	FWD		
BRAZOS RIV BASIN		FWD	MAY 1990	FINAL PLAN/FEB 90
WHITNEY	BRAZOS RIVER	FWD		
AQUILLA	AQUILLA CREEK	FWD		
PROCTOR	LEON RIVER	FWD		
BELTON	LEON RIVER	FWD		
STILLHOUSE HOLLOW	LAMPASAS RIVER	FWD		
GEORGETOWN	N.F.SAN GABRIEL	FWD		
GRANGER	SAN GABRIEL	FWD		
WACO	BOSQUE RIVER	FWD		
SOMERVILLE	YEGUA CREEK	FWD		
COLORADO RIV BASIN		FWD	NOVEMBER 1990	DRAFT PLAN/MAY 90
HORDS CREEK	HORDS CREEK	FWD		
O.C. FISHER	N. CONCHO	FWD		
GUADALUPE RIV BASIN		FWD	MAY 1991	DRAFT PLAN/DEC 89
CANYON	GUADALUPE RIVER	FWD		
RIO GRANDE RIVER BASIN		AD	JANUARY 1990	DRAFT PLAN/OCT 90
ABIQUIU	RIO CHAMA	AD		
COCHITI	RIO GRANDE	AD		
GALISTEO	GALISTEO CREEK	AD		
JEMEZ CANYON	JEMEZ RIVER	AD		
PECOS RIV BASIN		AD	FEBRUARY 1990	APPROVED PLAN/JUL 90
SANTA ROSA	PECOS RIVER	AD		

SECTION V - REGULATION OF MULTI-PURPOSE PROJECTS WITH HYDROPOWER

SECTION V

HYDROPOWER GENERATION AT SOUTHWESTERN DIVISION PROJECTS

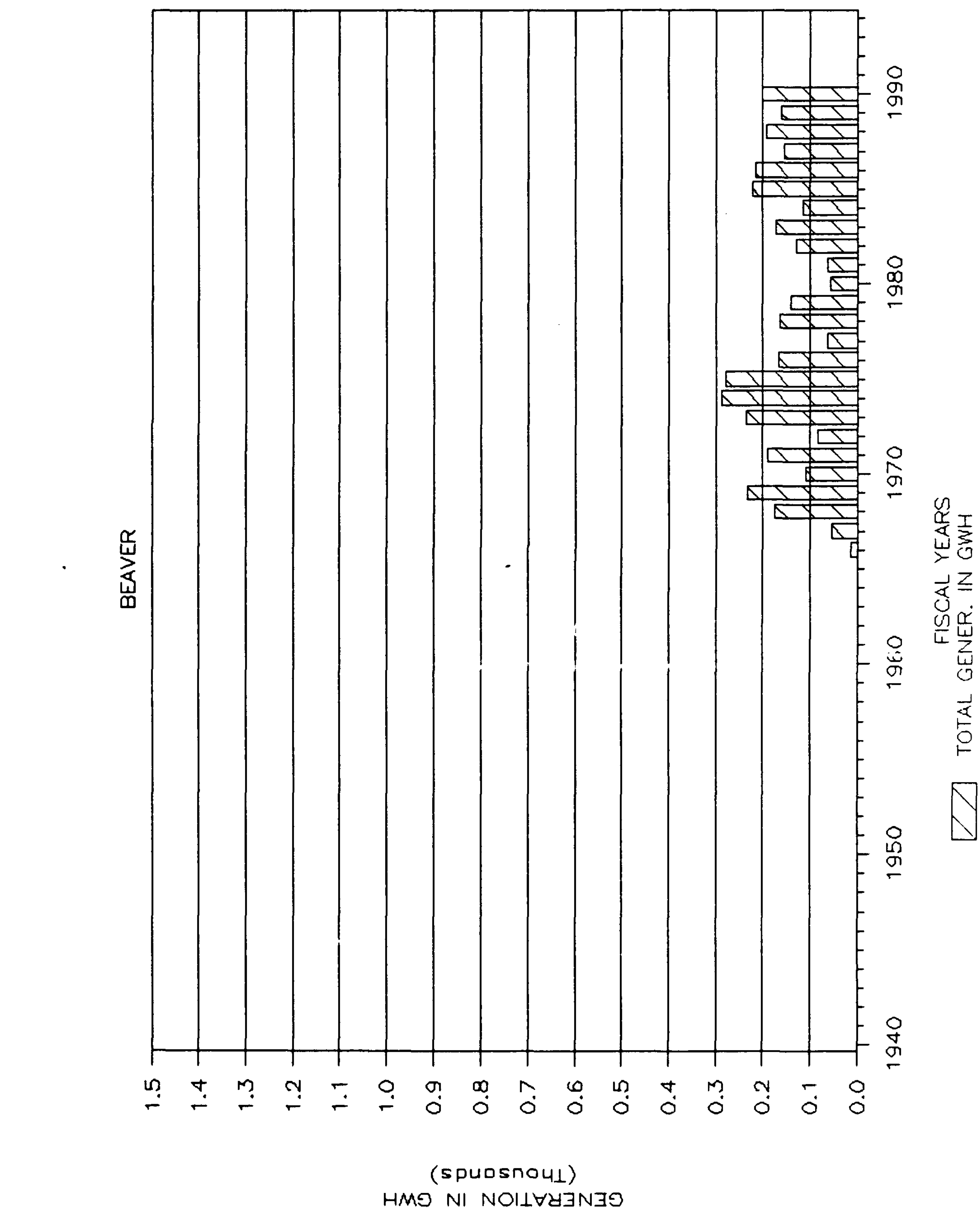
The 18 Hydropower Projects are listed in Table 1. Generation by project for the last five fiscal years are shown in Table 2. Also, generation by the projects, since impoundment, is shown on the following graphs.

TABLE 1

Projects	Basin	Stream	No. Units	Total Capacity MW	Plate No.
Beaver	White	White	2	112	V-1
Table Rock	White	White	4	200	V-2
Bull Shoals	White	White	8	340	V-3
Norfork	White	North Fork	2	70	V-4
Greers Ferry	White	Little Red	2	96	V-5
Keystone	Arkansas	Arkansas	2	70	V-6
Ft. Gibson	Arkansas	Grand	4	45	V-7
Webbers Falls	Arkansas	Arkansas	3	60	V-8
Tenkiller	Arkansas	Illinois	2	34	V-9
Eufaula	Arkansas	S. Canadian	3	90	V-10
R.S. Kerr	Arkansas	Arkansas	4	110	V-11
Ozark-Jeta Taylor	Arkansas	Arkansas	5	100	V-12
Dardanelle	Arkansas	Arkansas	4	124	V-13
Denison	Red	Red	2	70	V-14
Broken Bow	Red	Mountain Fork	2	100	V-15
Sam Rayburn	Neches	Angelina	2	52	V-16
Town Bluff	Neches	Neches	2	7	V-17
Whitney	Brazos	Brazos	2	30	V-18

TABLE 2
Fiscal Years
(1,000 GWH)

Projects	1986	1987	1988	1989	1990
Beaver	214.5	155.1	192.5	160.9	200.5
Table Rock	645.9	432.2	636.3	479.1	796.6
Bull Shoals	875.0	566.8	897.7	705.4	1197.3
Norfork	214.7	126.5	223.9	240.6	248.6
Greers Ferry	148.9	105.7	201.8	216.6	237.1
Keystone	333.0	500.9	312.4	254.8	292.9
Ft. Gibson	294.9	286.7	201.5	212.0	209.6
Webbers Falls	350.9	286.9	197.8	263.5	251.2
Tenkiller Ferry	174.1	147.5	134.7	121.3	144.5
Eufaula	336.1	461.2	282.4	304.1	370.0
R.S. Kerr	725.8	772.9	536.3	547.9	560.6
Ozark-Jeta Taylor	488.0	341.1	334.6	407.8	291.4
Dardanelle	799.6	830.1	600.6	702.6	566.4
Denison	294.5	533.2	291.3	309.6	330.6
Broken Bow	147.4	93.9	142.4	175.1	222.6
Sam Rayburn	105.6	147.4	112.4	125.7	157.5
Town Bluff	-	-	-	-	30.9
Whitney	50.8	109.9	17.5	46.7	85.1


BEAVER
GENERATION IN GWH
(Thousands)
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1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-1

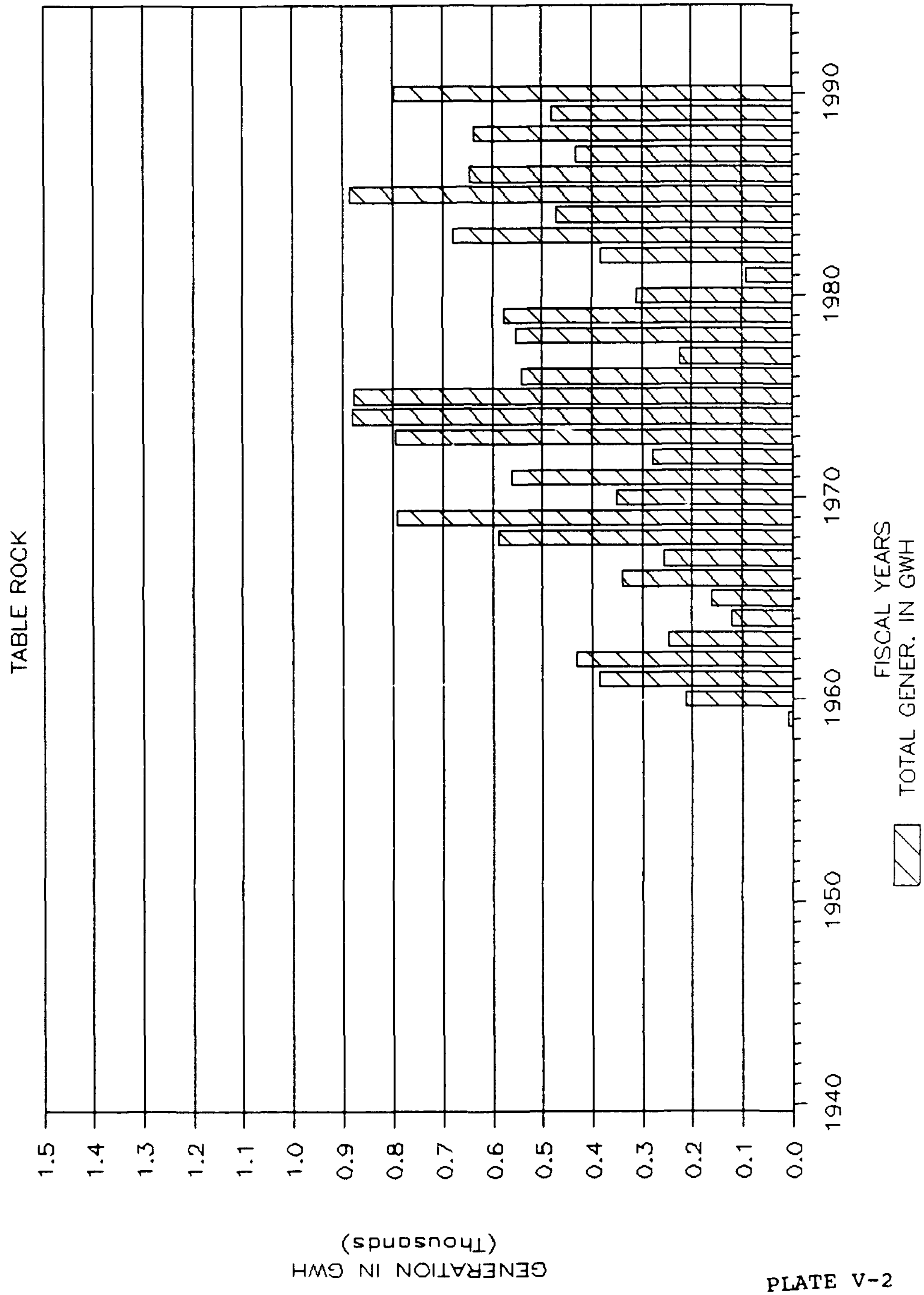
TABLE ROCK
GENERATION IN GWH
(Thousands)
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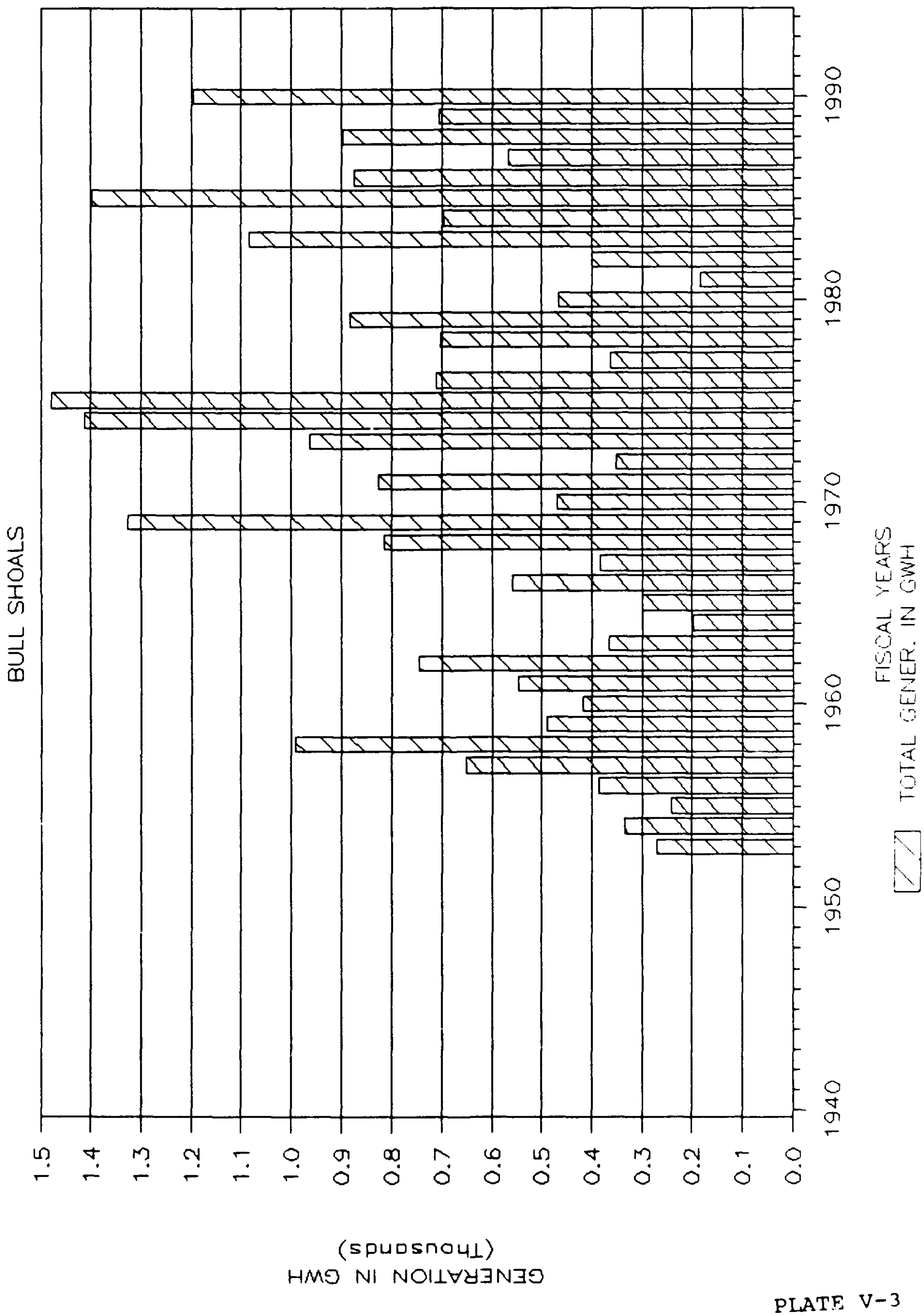
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-2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GENERATION IN GWH
(Thousands)
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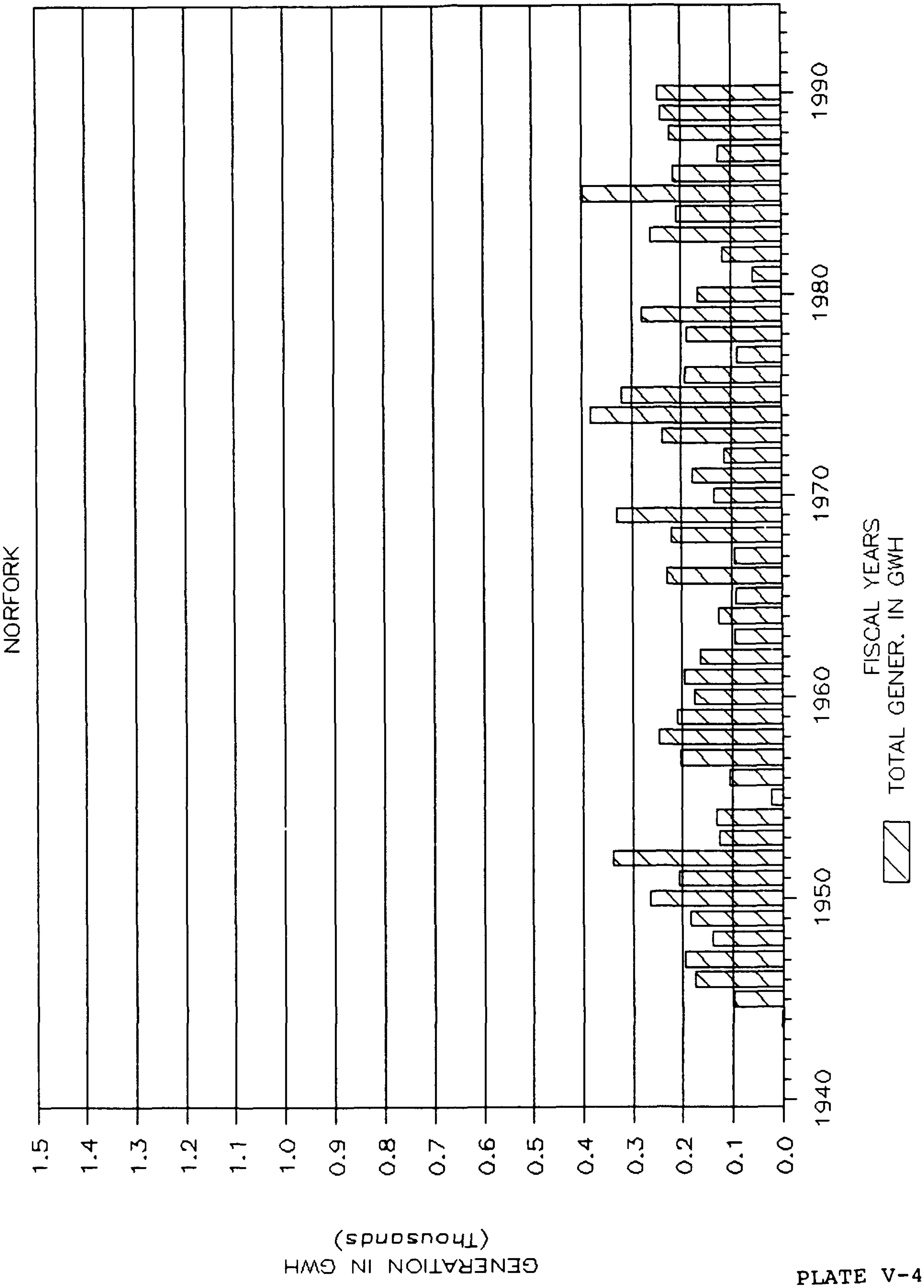
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-3



NORFORK
GENERATION IN GWH
(Thousands)
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0.7
0.6
0.5
0.4
0.3
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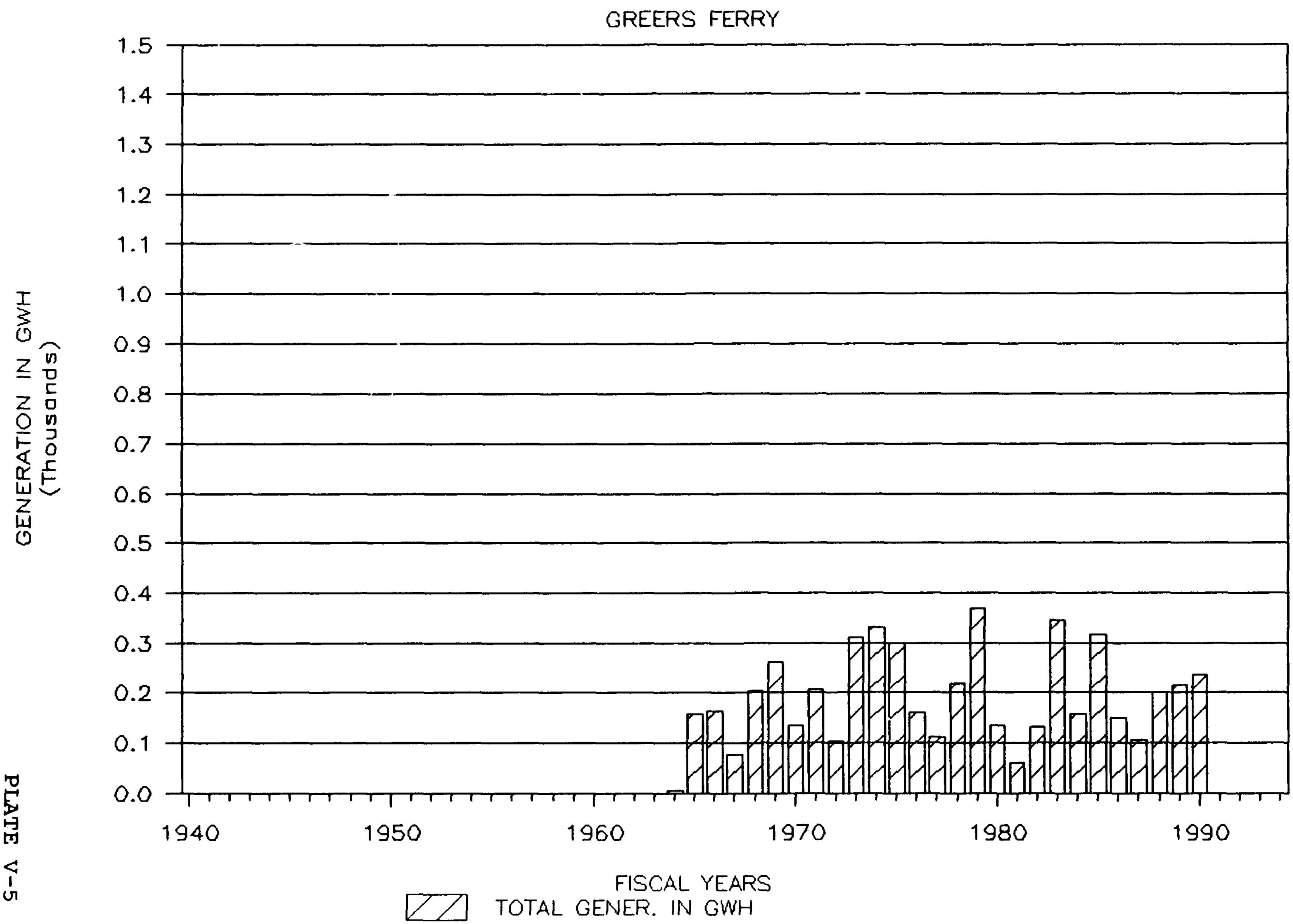
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-4



GREERS FERRY
GENERATION IN GWH
(Thousands)
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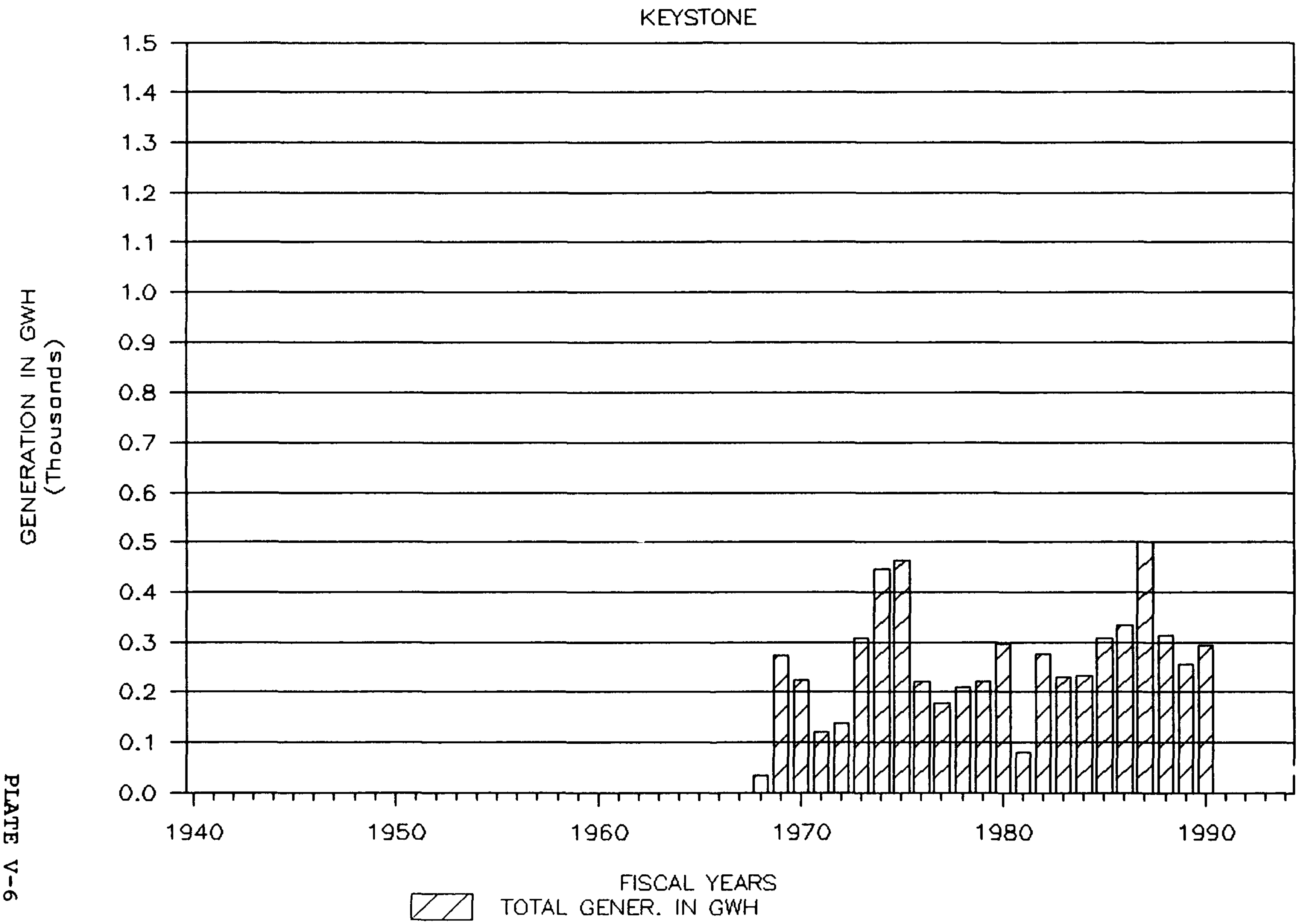
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-5


KEYSTONE
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1.3
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0.9
0.8
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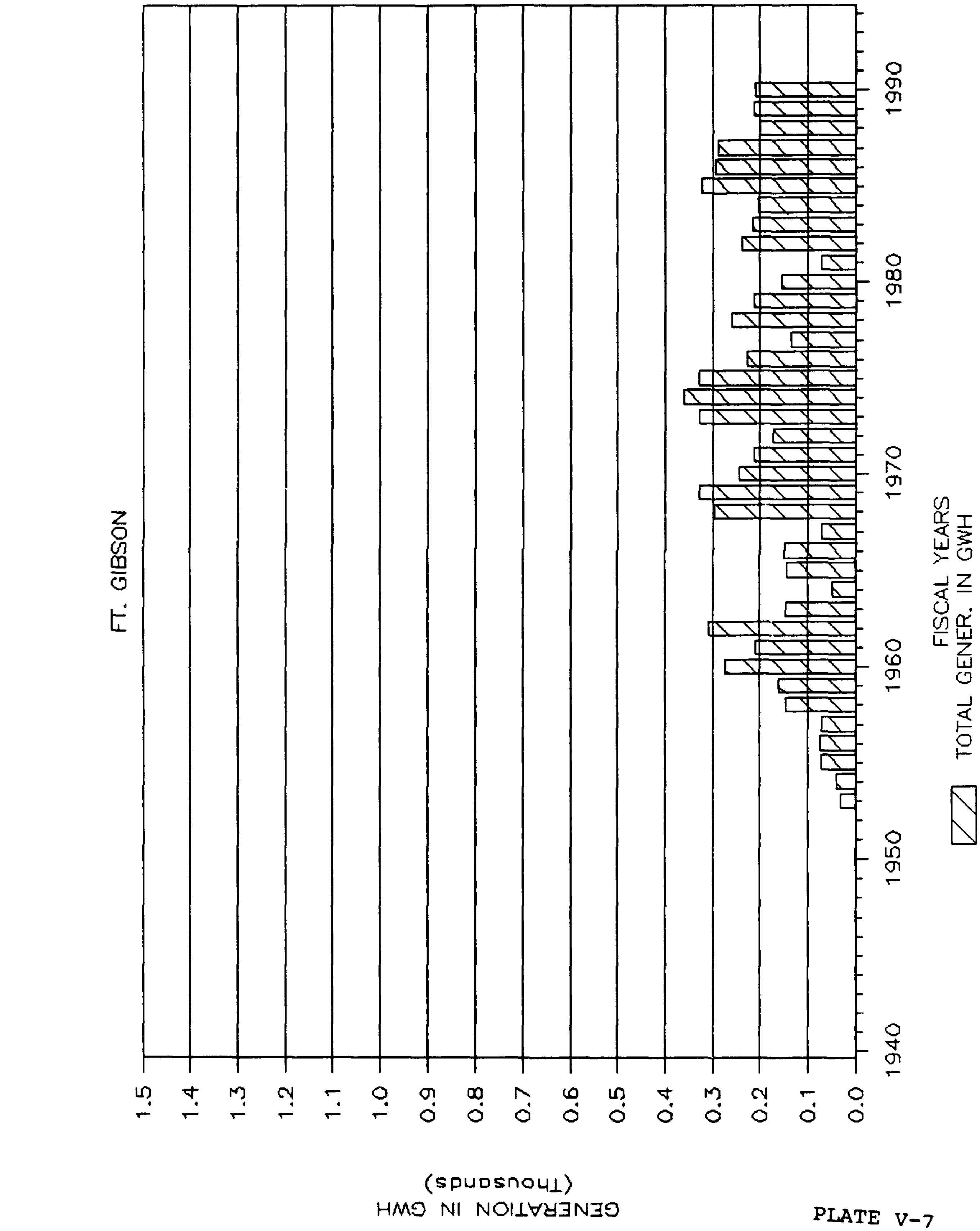
0.5
0.4
0.3
0.2
0.1
0.0
GENERATION IN GWH
(Thousands)
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-6


FT. GIBSON
GENERATION IN GWH
(Thousands)
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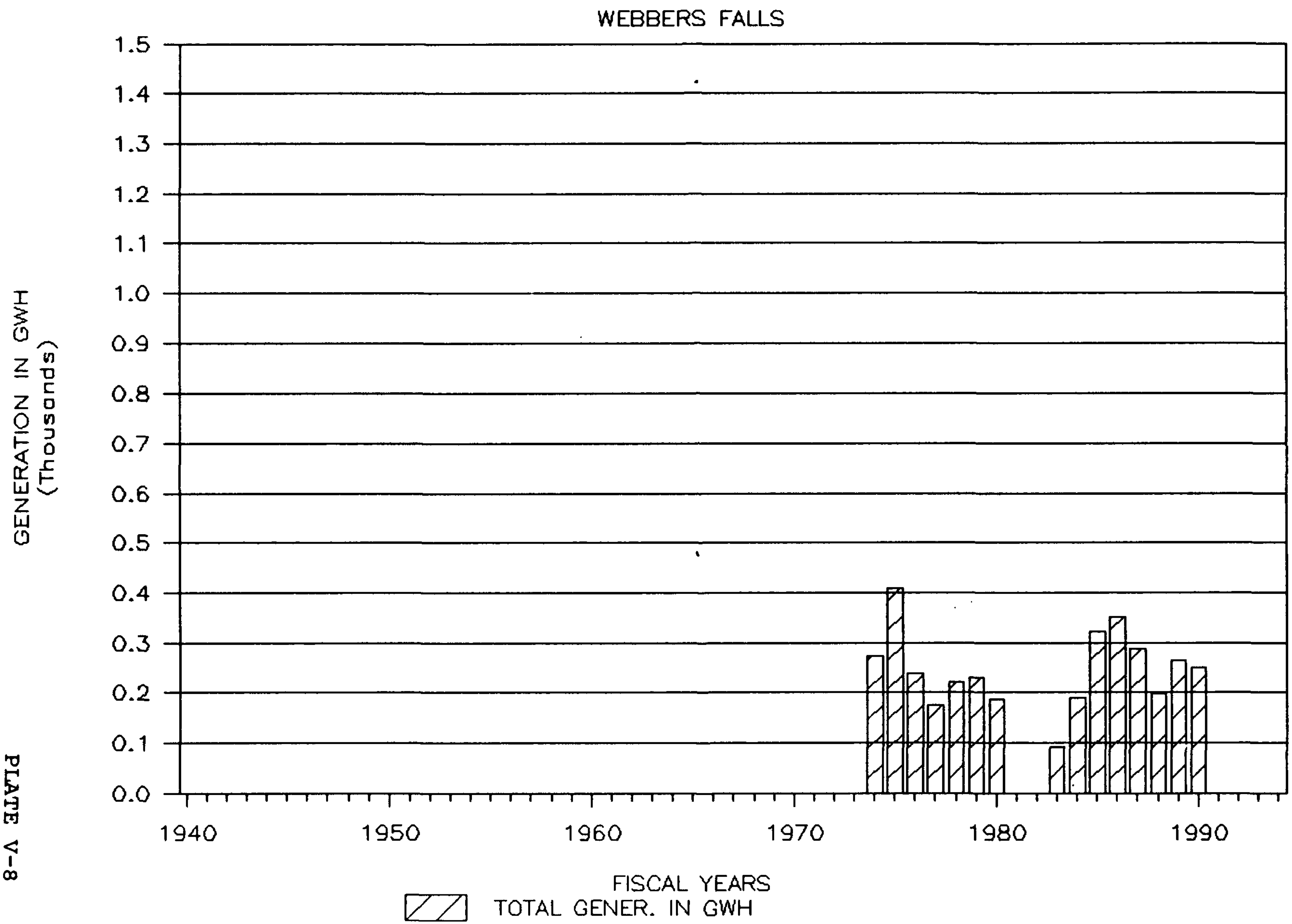
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-7


WEBBERS FALLS
GENERATION IN GWH
(Thousands)
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1.2
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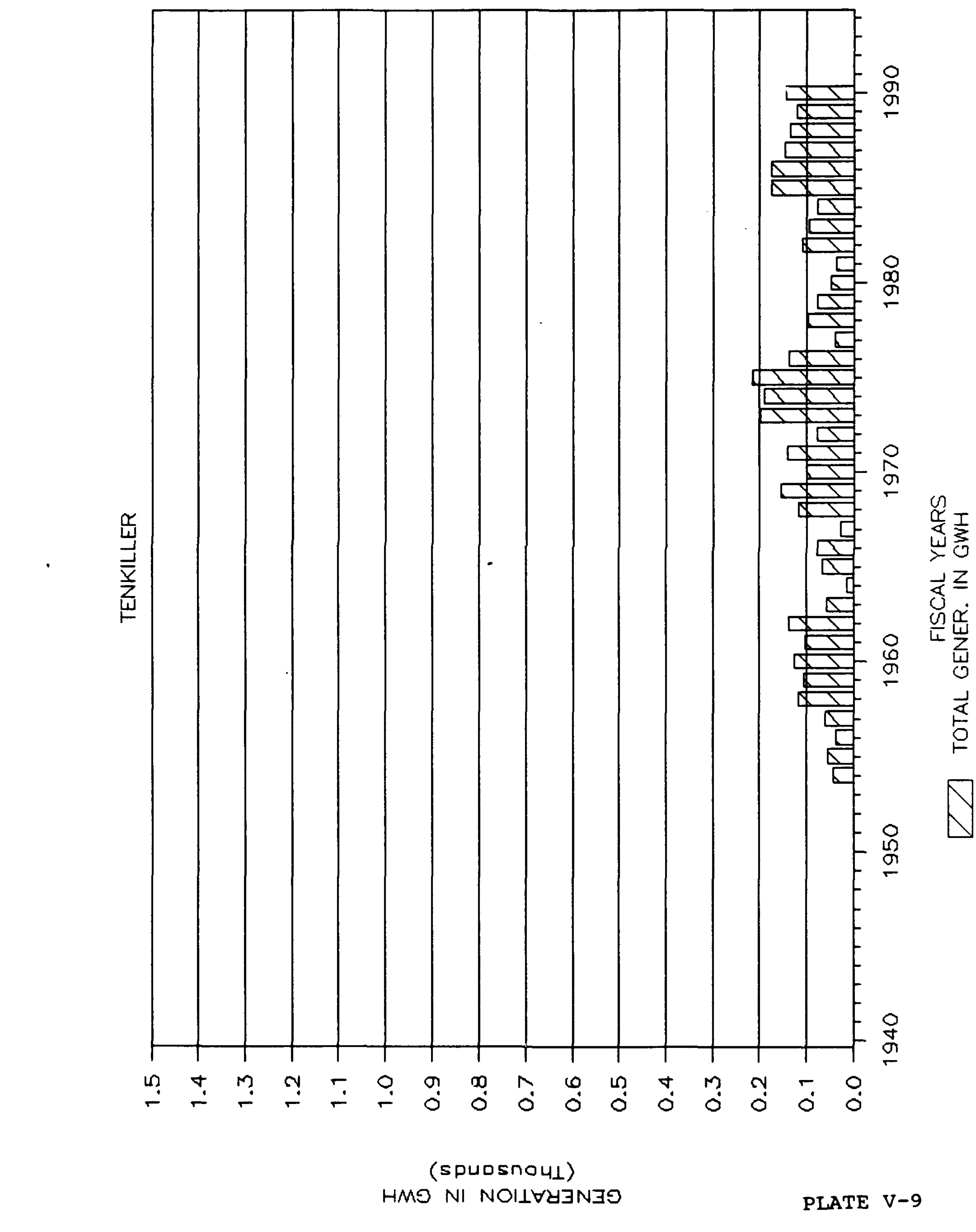
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-8


TENKILLER
GENERATION IN GWH
(Thousands)
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1.2
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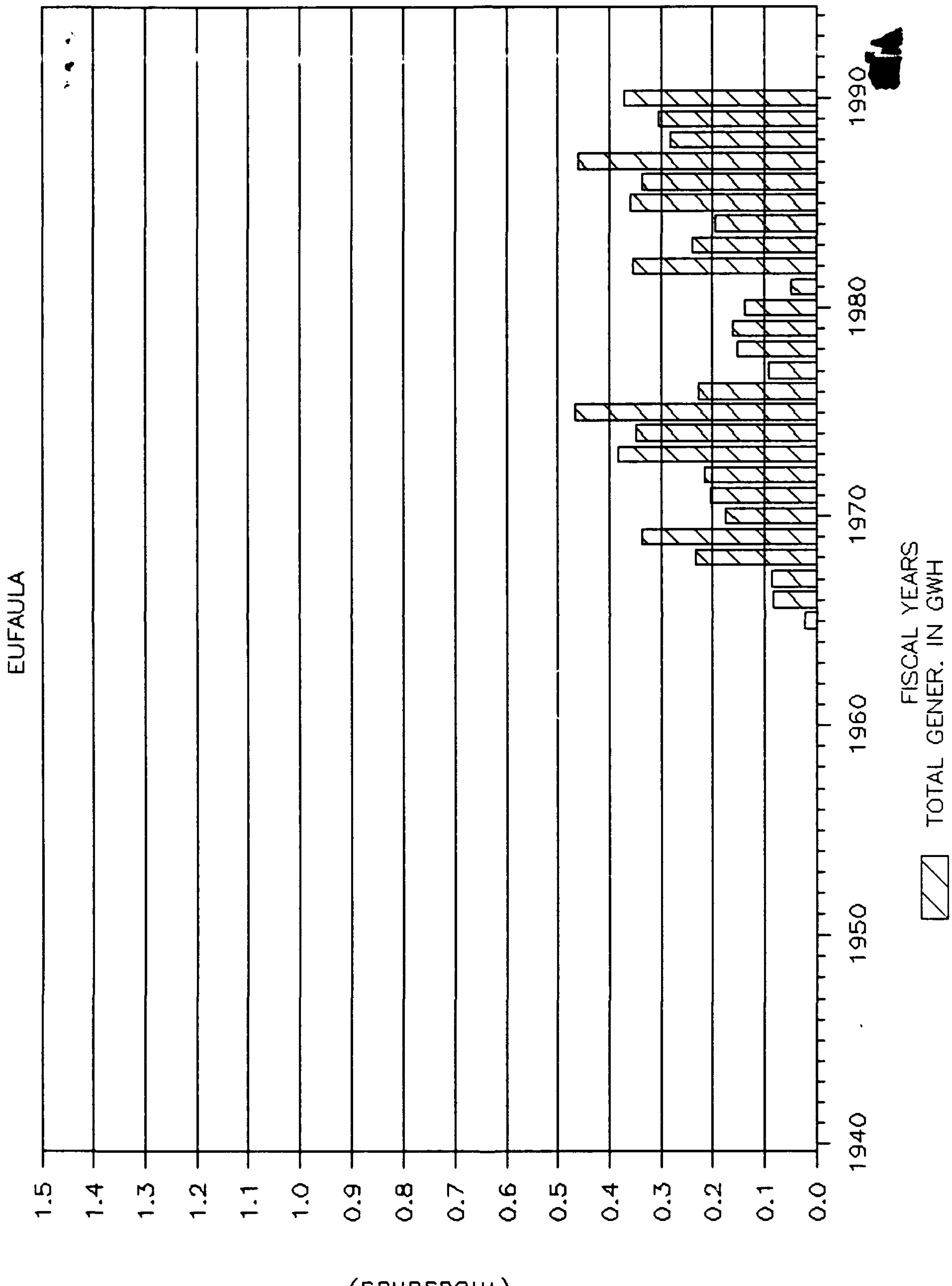
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-9


EUFAULA
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1.4
1.3
1.2
1.1
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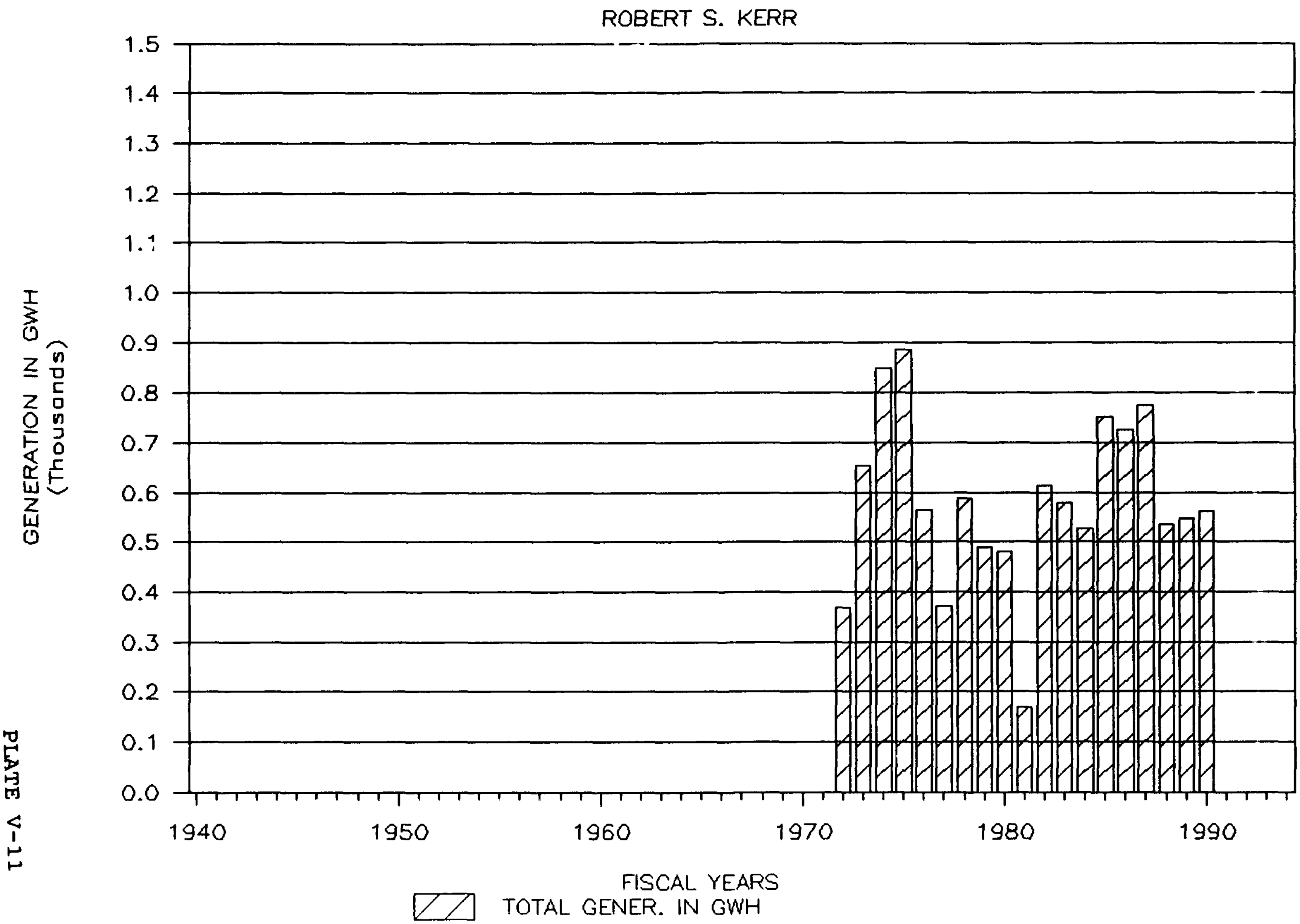
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH
GENERATION IN GWH
(Thousands)

PLATE V-10


ROBERT S. KERR
GENERATION IN GWH
(Thousands)
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1.2
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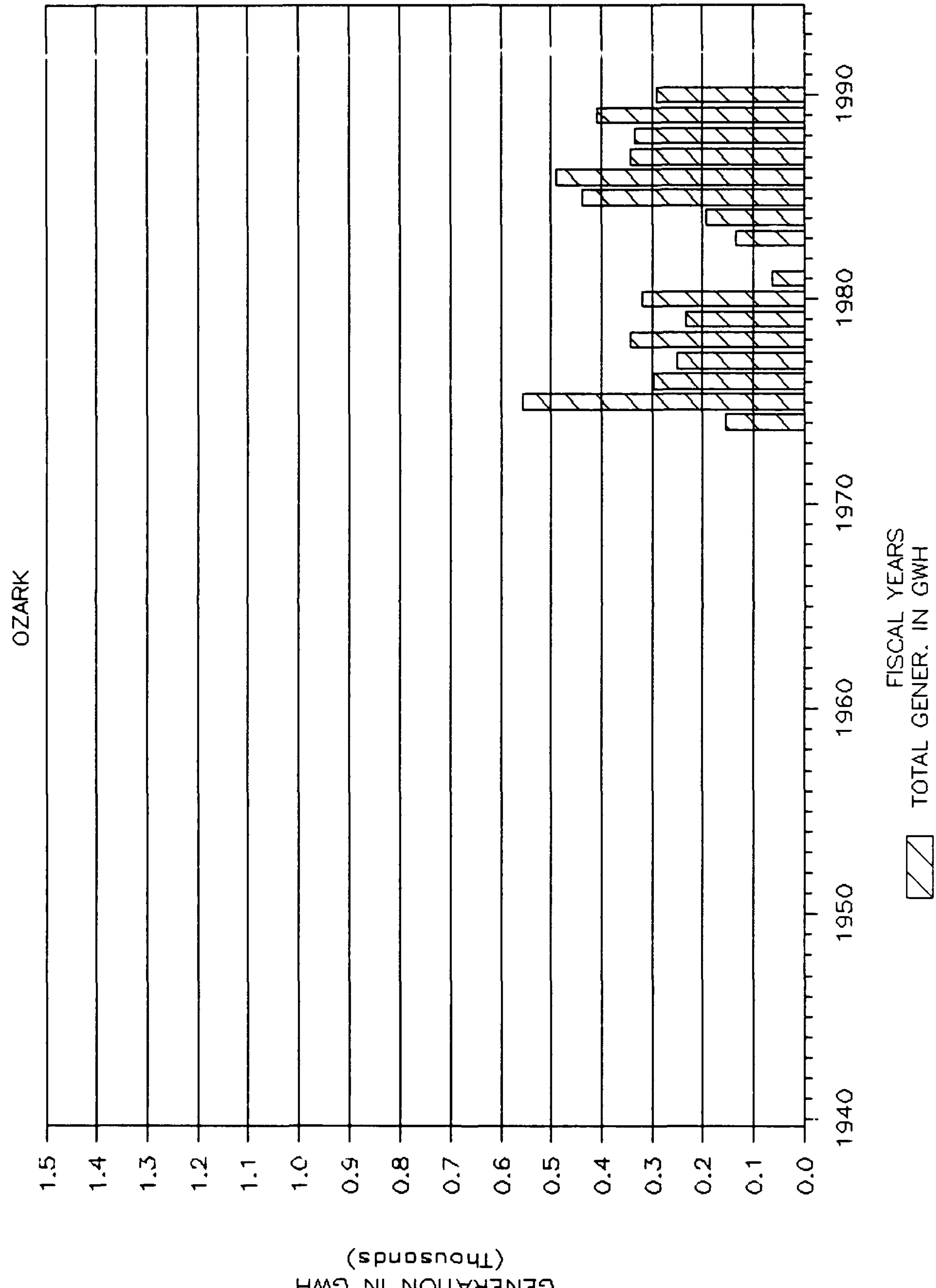
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-11


OZARK
GENERATION IN GWH
(Thousands)
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1.2
1.1
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0.7
0.6
0.5
0.4
0.3
0.2
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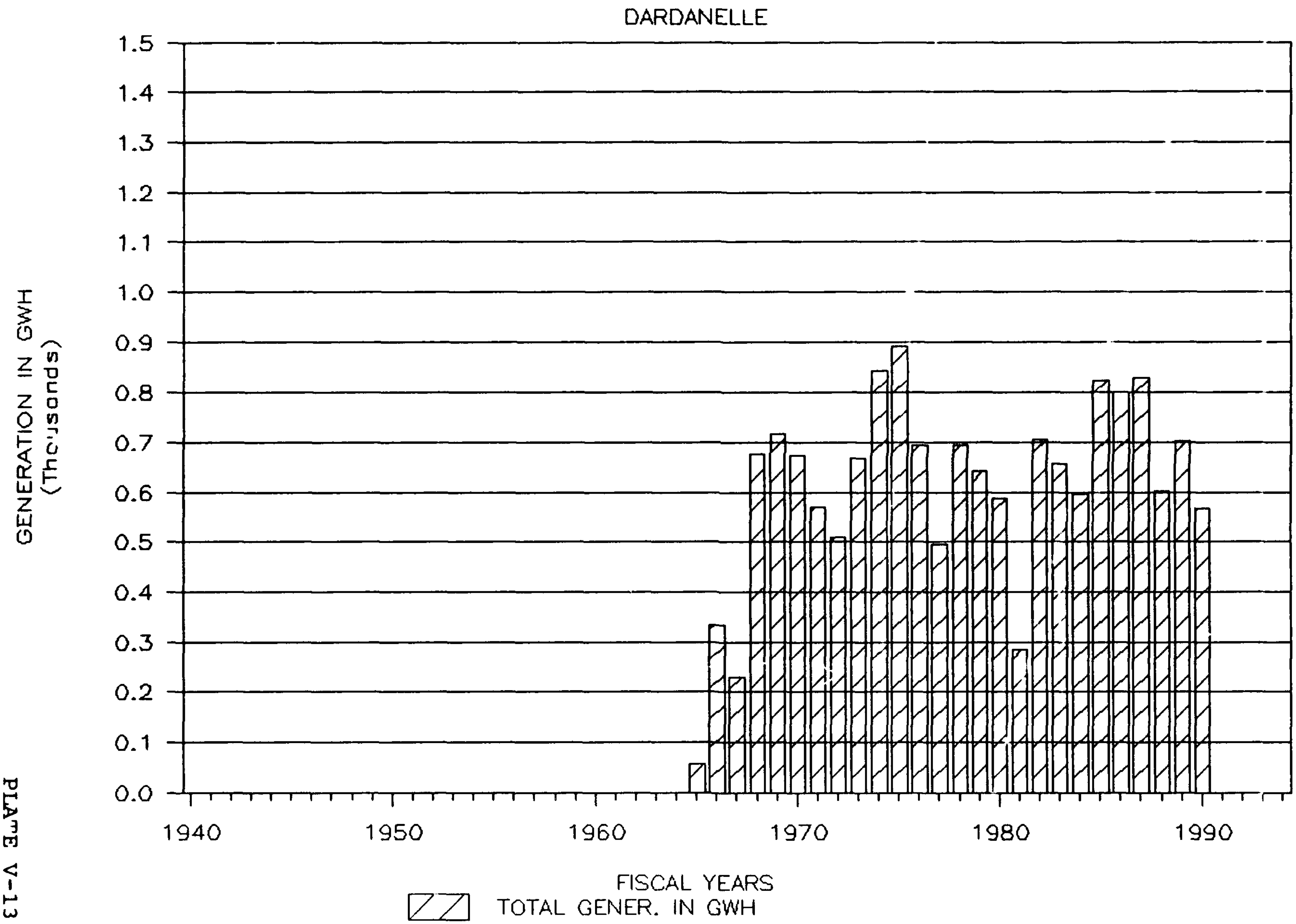
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-12


DARDANELLE
GENERATION IN GWH
(Thousands)
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1.2
1.1
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0.8
0.7
0.6
0.5
0.4
0.3
0.2
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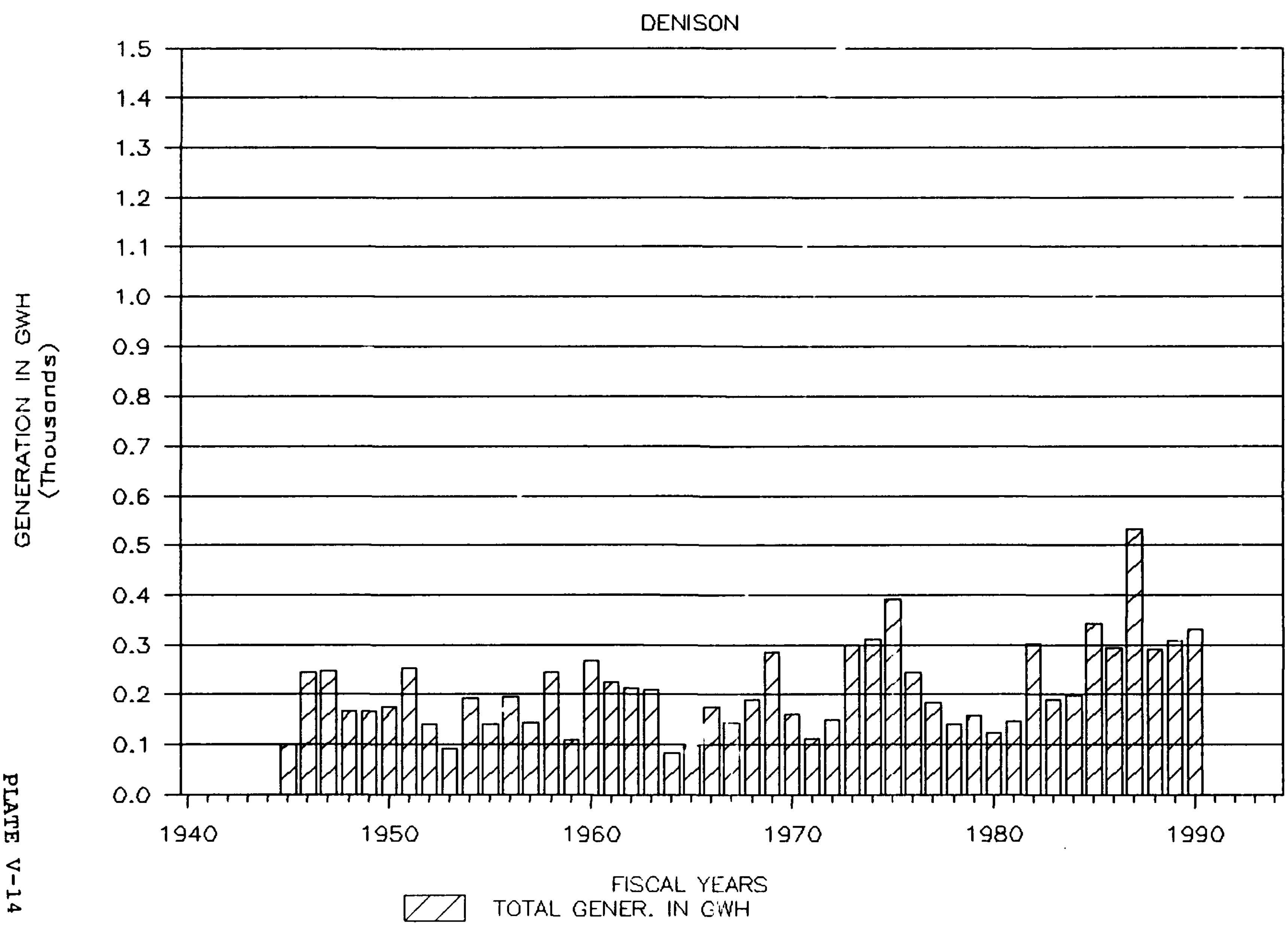
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-13


DENISON
GENERATION IN GWH (Thousands)
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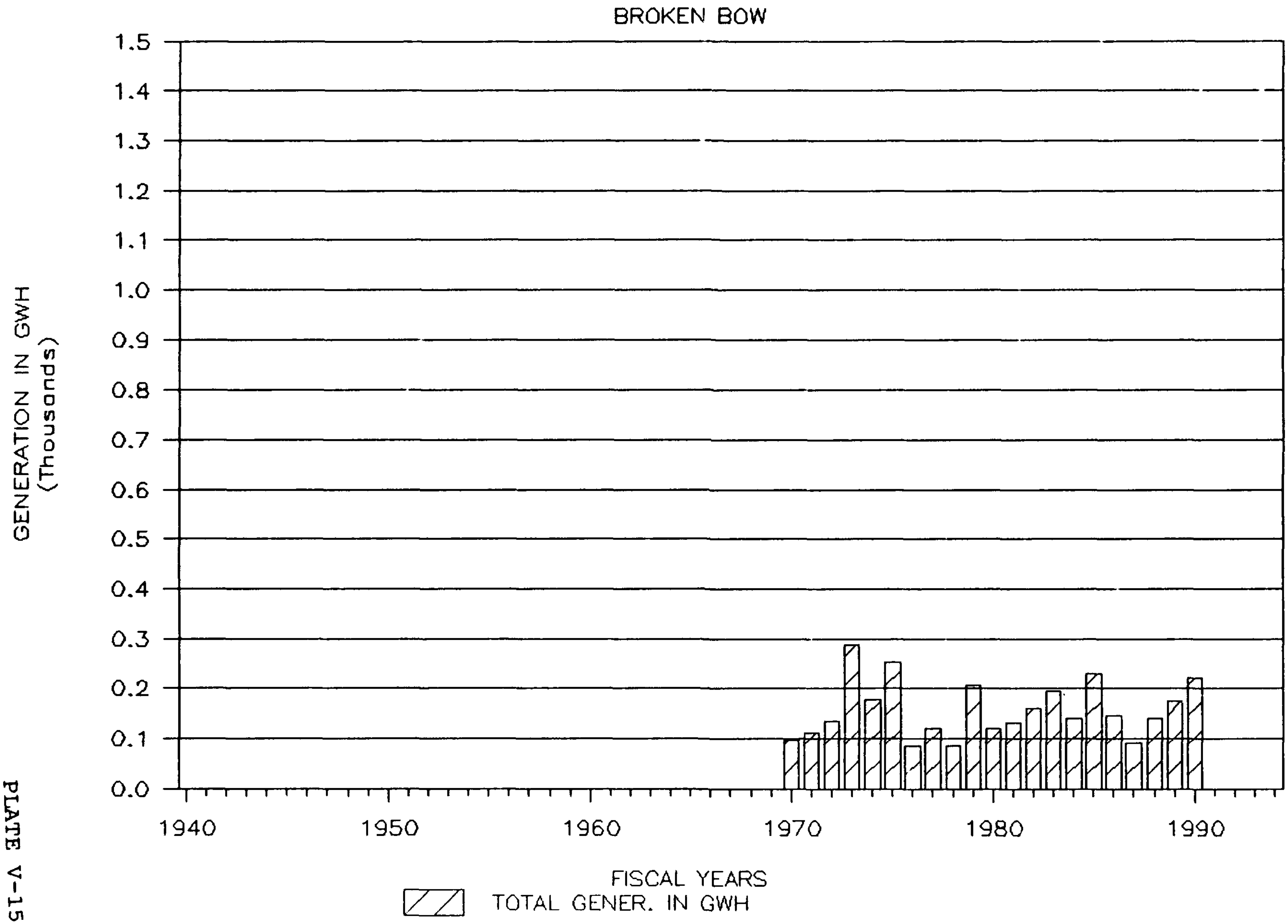
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-14



BROKEN BOW
GENERATION IN GWH (Thousands)
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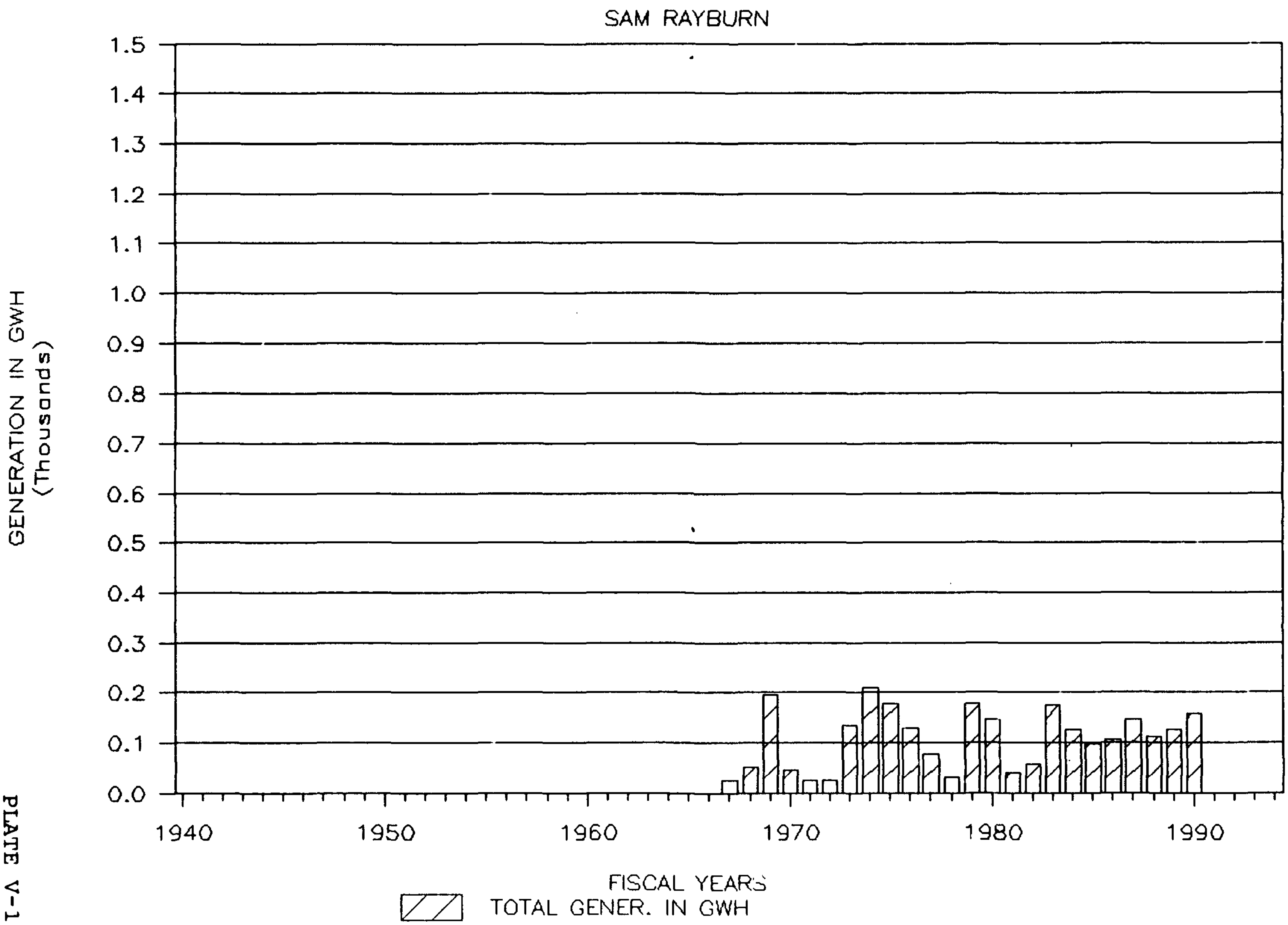
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-15


SAM RAYBURN
GENERATION IN GWH
(Thousands)
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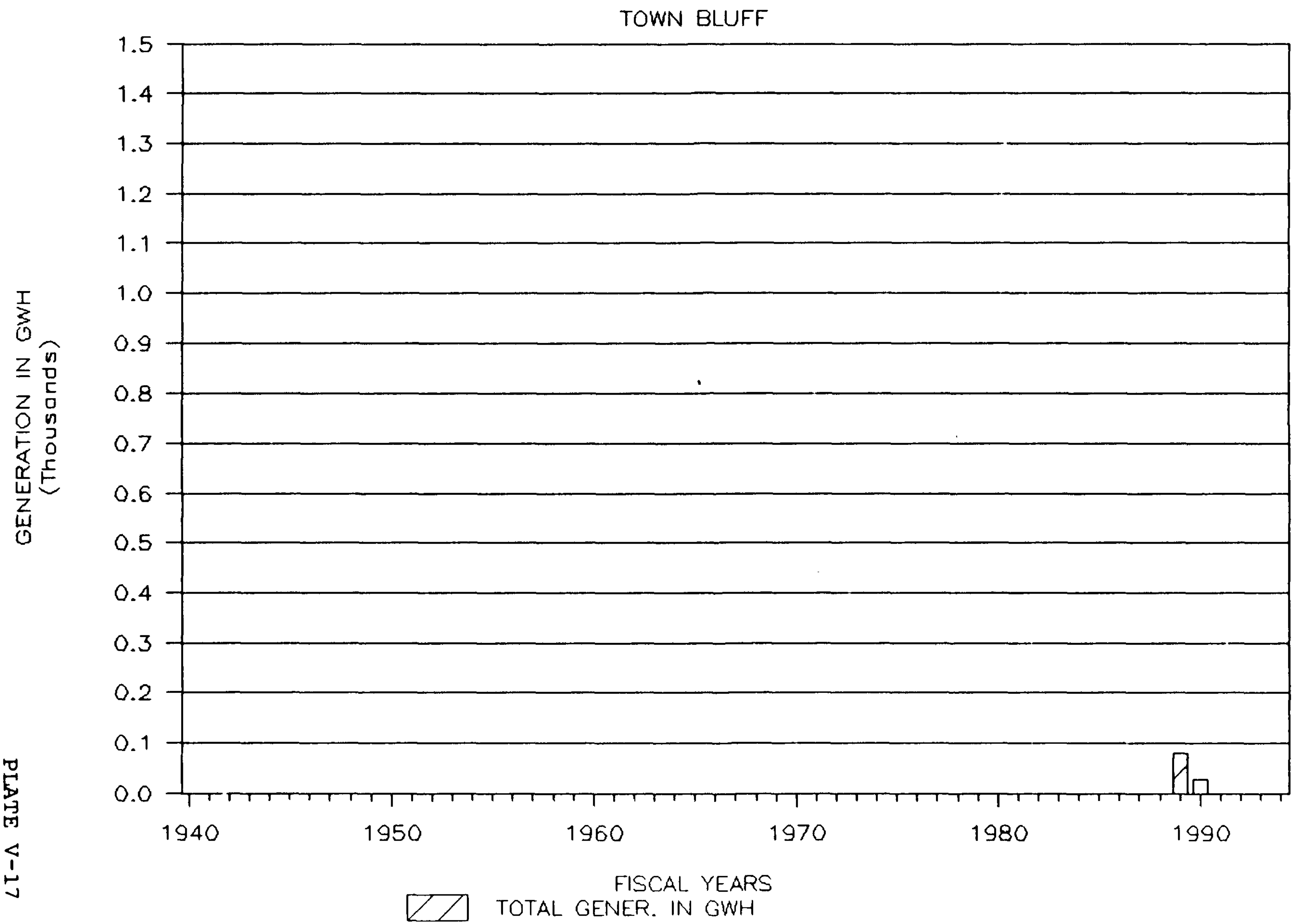
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-16


TOWN BLUFF
GENERATION IN GWH
(Thousands)
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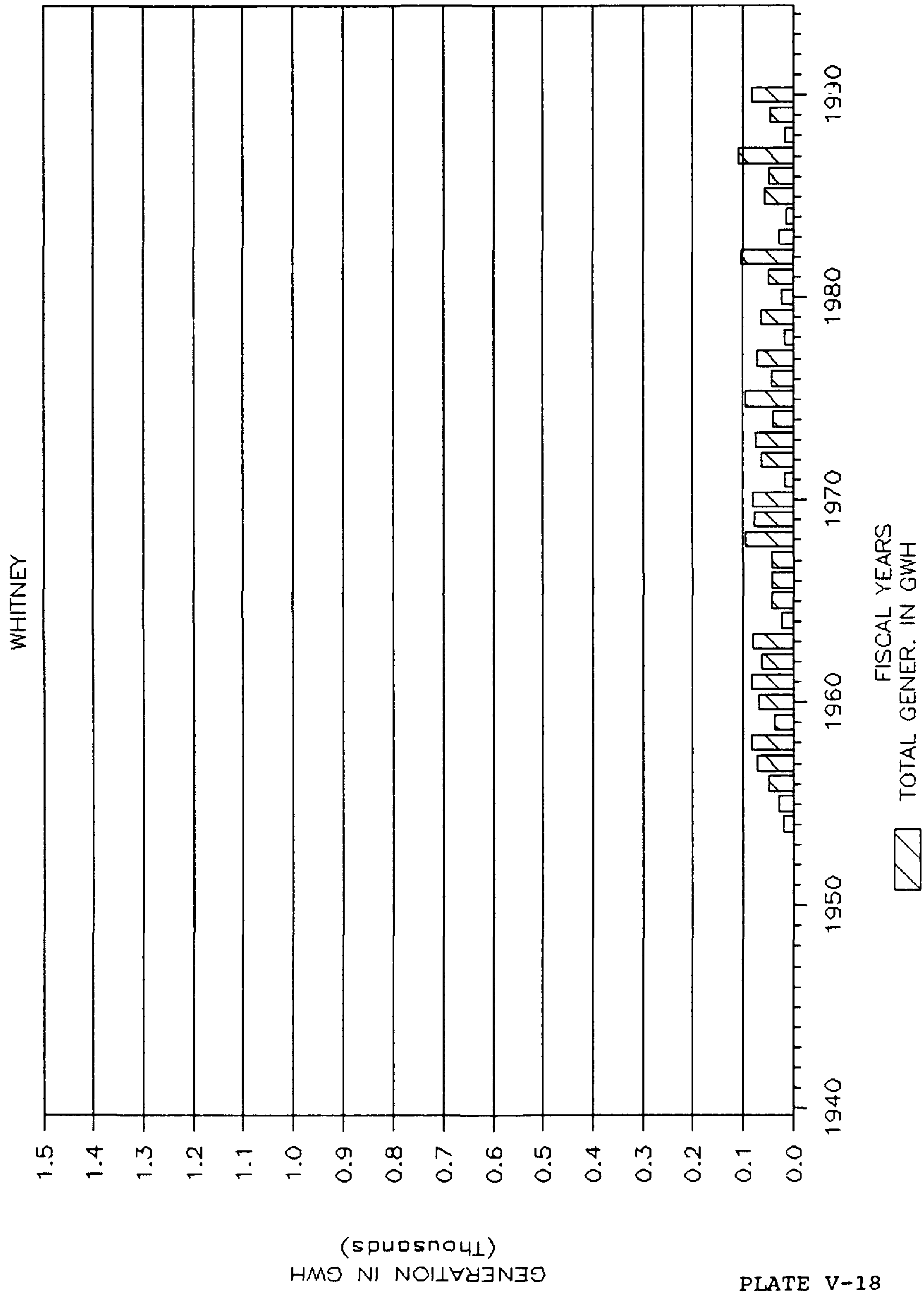
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-17



WHITNEY
GENERATION IN GWH
(Thousands)
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1.1
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0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1940
1950
1960
1970
1980
1930
FISCAL YEARS
TOTAL GENER. IN GWH

PLATE V-18

SECTION VI - DISTRICT WATER CONTROL ACTIVITIES

SECTION VI - DISTRICT WATER CONTROL ACTIVITIES

SECTION VI - DISTRICT WATER CONTROL ACTIVITIES

1. PROJECT VISITATION BY WATER MANAGEMENT PERSONNES.

a. ALBUQUERQUE DISTRICT. During FY90 all of the projects in the Albuquerque District, with the exception of Two Rivers and Brantley Reservoirs, were visited by personnel from the Reservoir Control Section.

b. FORT WORTH DISTRICT. Six district reservoir projects were visited by Water Management personnel during Fiscal Year 1990. Lewisville and Grapevine Lakes were visited in October 1989. Bardwell and Navarro Mills Lakes were visited in January 1990. Whitney and Benbrook Lakes were visited in April 1990. Proctor and Lavon Lakes were visited in June 1990, and Ray Roberts Lake was visited in September 1990. Water Control Manuals, flood control and emergency operation procedures, gate operations and calibration, potential areas of flooding, shoreline and downstream erosion, impacts of project operations, automation of project weather station, and the Water Control Data System data collection and dissemination were discussed at the time of these visits. In addition, the impacts of non-federal hydropower operations were discussed with the Lewisville and Ray Roberts Lakes personnel.

c. GALVESTON DISTRICT. On 22 August 1990, Hydrology and Hydraulics personnel discussed operational procedures with the Addicks project office. Several trips were made to the Project Office during the year to interrogate the Alert Base Station.

d. LITTLE ROCK DISTRICT. The system regulator for Blue Mountain and Nimrod Lakes visited the projects after the high lake levels and releases experienced in May. The primary reason was to become familiar with the areas that were of concern during the high water. At Nimrod these included the Wallace Bridge on the Fourche LaFave, the project stilling basin, and the park areas around the lake. The stilling basin had sustained slight damage to fencing and some rock displacement. Park areas show damage due to wave wash. Extensive pavement repair and rip-rap placement was under way. At Blue Mountain the Highway 309 bridge below the dam was visited. It had sustained no visible damage after its inundation, but its approach is threatened by bankcaving. In the pool area wave wash damage was noted in the parks and the spillway cover material had yet to be replaced. The county bridge at Ashley Creek which was raised in 1985 and again inundated this year was visited, as was the area on that road where water came close to a residence. Previous to this visit a representative of the Reservoir Control Section had visited Nimrod to instruct office personnel on procedures for retrieving data from the District Water-Mini.

The Little River system regulator made two trips to the projects. The first was an aerial inspection trip of the Red River flood area in the vicinity of Index, Arkansas. Participants included the District Engineer, Permits Branch and Planning Division personnel. A short meeting was held with

representatives of the Millwood Resident Office to discuss the flood operations underway at that time. Later another visit was made in conjunction with Permits Branch to discuss with a permit applicant the permitting process for the area below the dam and the regulation procedures for Millwood Lake.

The Arkansas River system regulator visited the Emmet Sanders Lock and Dam after a barge accident in March. In conjunction with Hydraulics Section and Navigation Section personnel, a float test was conducted there to attempt to determine if a navigation hazard existed in the approach to the upstream lock entrance. In addition, representatives of the Hydrology and Hydraulics Branch were in attendance on the Annual Arkansas River Inspection Trip during the portion from Dardanelle to the mouth of the White River.

e. TULSA DISTRICT. Twenty project sites were visited by Reservoir Control Section personnel this year. The projects visited and the purpose for the visits are listed in the following table.

PROJECT VISITATION - FY 90

PROJECT	
Arbuckle	Scheduled Reservoir Control Visit
Big Hill	Site Familiarization
Broken Bow	Observe Trout Release
Eufaula	Site Familiarization for GAD Investigation Team
Fall River	Periodic Inspection
Fort Cobb	Scheduled Reservoir Control Visit
Foss	Scheduled Reservoir Control Visit
Kaw	Site Familiarization
Kemp	Scheduled Reservoir Control Visit
Keystone	Site Familiarization
Oologah	Conference on Stilling Basin Repair Contract
Pine Creek	Dam Safety Presentation
Robert S. Kerr	Site Familiarization
Sardis	Dam Safety Presentation
Tenkiller	Observe Spillway Operation
Texoma	Lake Advisory Committee Meetings
Toronto	Periodic Inspection
Waurika	Scheduled Reservoir Control Visit and Dam Safety Presentation
Webbers Falls	Site Familiarization for GAD Investigation Team
Wister	Observe Embankment Rehabilitation Work

2. Special Reservoir Operations.

a. ALBUQUERQUE DISTRICT. The watersheds within the Albuquerque District received well below normal snowmelt runoff and no major rainfall events occurred in 1990. This was the third consecutive year of below normal snowmelt runoff conditions. Reservoir irrigation storage was severely depleted at most projects, but above normal summer precipitation helped alleviate the impact on agricultural production.

Work continued on the development of Drought Contingency Plans (DCP). The Arkansas River Basin and Pecos River Basin DCP were approved and distributed. The Canadian River Basin DCP was completed and submitted to SWD for final approval. The second draft of the Rio Grande Basin DCP has been submitted to SWD for approval prior to distribution for inter-agency review.

During FY90 the Arkansas River Basin was in a moderate to extreme drought with Trinidad Lake and John Martin Reservoir reaching Level 4 severity at the end of the irrigation season. The Pecos River Basin was in a moderate to severe drought reaching Level 3. The Canadian and Rio Grande Basins were in a moderate drought reaching Level 2 severity. The primary purpose of reservoir storage in the Albuquerque District is for agricultural irrigation and in times of drought, the limited alternative sources of trans-basin water are not economical for agricultural purposes. Therefore, there were no requests for assistance or coordination during these drought periods.

The non-Federal hydropower plant at Abiquiu Dam began generating power in Mar 1990. This a run-of-river plant with a 12.6 megawatt capacity.

Work continued on the implementation of the Morning Report System in 1990. Over half of our projects have converted to the use of the new software. A Users Manual and an Operation and Maintenance Manual were prepared for Project and District personnel.

The Pecos River Basin real-time rainfall forecasting model was revised to accommodate the latest HEC software revisions. A Users Manual has been prepared for the use of the model. Work continued on developing a real-time rainfall forecasting model in the Arkansas River Basin. It is about 70 percent complete and should be available for use by Mar 1991.

b. FORT WORTH DISTRICT.

(1) General. Evacuation of flood waters stored at the Fort Worth District lakes was initiated after the flood of May-July 1989. By October 1, 1989 only six of the 24 Corps lakes were in the flood control pool. The storages occupied generally ranged from 90 percent of conservation pool to 2 percent of flood control pool. The first quarter of the fiscal year experienced below normal rainfall and by January 1990 only one lake was in the flood control pool. Above normal rainfall during the months

of January, February, and March, however, set the stage for a disastrous flood during late April and early May. The April-May 1990 flood can be characterized as having three major rainfall events: April 19-21, April 25-27, and May 1-4, 1990. Runoff from the late April rains produced some floods of record with rainfall amounts varying from an unofficial 23 inches in Comanche County to three to five inches in the dryer areas of the state. The early May rains ranged from six to ten inches in north Texas and resulted in severe flooding. The most critical flooding occurred along the Trinity River. By the end of May most areas in north Texas had received in excess of the average yearly rainfall. In addition to the special operations for the flood of 1990, special releases were made for two canoe races and one raft race downstream of Corps Lakes. Detailed flood operations, deviations from approved Water Control Plans, status of non-federal hydropower operations, and the status of the automation of project weather stations are covered in the following paragraphs.

(2) FLOOD OPERATIONS.

(a) GENERAL.

During the flood of 1990, the Brazos, Trinity, Neches, and Red River Basins experienced significant flooding. The flood resulted in eight of twenty-four Corps lakes attaining record elevations, four exceeding the top of flood control pool, three experiencing flow over the ungated spillways, and three lakes initiating surcharge operations. In the Brazos River basin 8 of the 9 Corps lakes utilized some or all of their flood control storage and two lakes established record elevations. In the Trinity all 8 lakes utilized some or all of their flood control storage and 6 established record elevations. In the Neches and Red River basins, all of the Corps lakes within the Fort Worth District utilized some of their flood control storage.

At the peak of the flood, the Fort Worth District lakes were storing in excess of 5 million acre-feet of flood waters. The flood waters and wave action, however, resulted in significant damages to Corps facilities at the lakes. Picnic facilities, shelters, restrooms, access roads, and boat ramps were heavily damaged at most of the Corps lakes. In addition, many projects sustained noticeable shoreline erosion. In all an estimated $35 million worth of damages were incurred to Corps facilities. In general, the operations of the Corps lake projects within the Fort Worth District were instrumental in reducing downstream flooding and damages.

(b) BRAZOS RIVER BASIN.

At the end of March 1990 the percent pool occupied at the Corps lakes in the Brazos River basin ranged from 78% of the conservation pool at Georgetown Lake to 12% of the flood control pool at Aquilla Lake. Rainfall during the early spring was above normal and created saturated soil conditions. The April 25-27 rainfall produced significant runoff and a rapid

increase in the inflow to the lakes. In general, the Brazos River lakes peaked between May 5 and May 9 storing a peak total of approximately 1.8 million acre-feet of flood water. Whitney, Aquilla, and Proctor lakes experienced the greatest rises. Record elevations of 1197.62 and 549.16 feet were established at Proctor and Aquilla Lakes respectively while Whitney Lake reached 564.89 feet, its second highest since impoundment. As downstream channel capacity become available, evacuation of flood waters was initiated in accordance with the water control plans for the various lakes. The peak flood control storage occupied in April at Corps lakes ranged from 2 percent at Stillhouse and Somerville Lakes to 88 percent at Proctor Lake. Peak April inflows to the Brazos lakes ranged from 6,000 cfs at Granger Lake to 175,000 cfs at Proctor Lake.

Before the majority of the flood waters generated by the April storms could be evacuated, runoff from the May 1-4 rains caused a second significant rise in the lakes in the Brazos River basin. All lakes except Georgetown Lake utilized some or all of their flood control storage. Peak May flood control storage utilized at the lakes ranged from 3 percent at Somerville Lake to 103 percent at Proctor Lake. Peak May inflows ranged from approximately 20,000 cfs at Granger and Stillhouse Lakes to 120,000 cfs at Whitney Lake. The rainfall accumulation at the lakes in the Brazos River basin during April and May totaled from 5.22 inches at Somerville Lake to 13.97 inches at Proctor Lake.

The heavy rainfall upstream of Proctor and Aquilla Lakes resulted in both lakes reaching record pool elevations. From 0800 hours on April 25 to 0800 hours on April 30 the Proctor lake elevation rose 31.17 feet. The greatest rate of rise was experienced from 0000 hours on April 26 to 0000 hours on April 27 when the lake level rose 24.68 feet in 24 hours. The record pool level of 1197.62 occurred on May 2 and was 0.62 feet above the top of flood control pool and top of gates. Surcharge operations were initiated on May 2 and releases increased until the maximum of 24,800 cfs was reached at 2300 hours. This flow was well in excess of the downstream channel capacity of 2,000 cfs. As the flood waters were evacuated and the pool level dropped below top of flood control pool the release rate was decreased to approximately 4,000 cfs. An approved deviation from the Water Control Plan allowed for the continuation of the 4,000 cfs so that flood control storage could be regained for use should future rain occur. The record amount of flood water stored at Proctor Lake during the flood required in excess of 4 months to evacuate. Numerous pecan trees on the lands within the flood pool easement and along the downstream channel were adversely impacted due to the duration of the high water levels.

Whitney Lake, while not attaining a record pool elevation, did reach 564.89 feet or 79 percent of flood pool, its second highest level since impoundment. The peak inflow to the lake was approximately 120,000 cfs. The high lake level and the continuous wave action of the lake waters cause major damages to

many of the Corps facilities. Restroom facilities, shelters, picnic facilities, and marinas were severely damaged. In addition portions of the shoreline sustained noticeable erosion.

Due to the large channel capacity on the main stem of the Brazos, flood waters were evacuated fairly rapidly. Local flooding on the major tributaries were common but usually of short duration. Minor agricultural damages were reported below some of the projects on the Little River system. Upon evacuation of flood waters at Proctor Lake, the flood releases spilled over the river banks, causing agricultural flooding. Other low lying areas and sloughs experienced flooding for extended periods along the San Gabriel and Leon Rivers.

(c) RED RIVER BASIN.

The storm of April 19-21 and April 25-27, 1990 attributed to a significant portion of the flood control storage being utilized at Wright Patman and Lake O' The Pines Lakes. At the April peak Lake O'The Pines occupied 32 percent of its flood control storage and Wright Patman 36 percent of its flood control storage. During the May 1-4 rains, Wright Patman Lake experienced a significant increase in flood control storage utilized, raising the pool to elevation 252.17 feet or 66 percent of the flood pool and storing approximately 1.5 million acre-feet of flood water. Lake O'The Pines experienced a smaller rise with a peak elevation of 237.62 feet and stored approximately 175,000 acre-feet of flood water. The rate of evacuation of the flood waters was progressively increased as downstream channel capacity become available. Releases from both Lake O'The Pines and Wright Patman Lake were curtailed for almost 3 weeks due to downstream flooding at Shreveport, Louisiana. At both lakes, the release rates were not increased until the river forecast issued by the National Weather Service River Forecast Center in Slidell, Louisiana indicated that adequate channel capacities were available. Once channel capacity was available, the Southwestern Division Reservoir Control Center coordinated releases from projects in the Fort Worth, Tulsa, and Little Rock Districts in the Southwestern Division with the Vicksburg District through the Lower Mississippi Valley Division. Several homes in low lying areas experienced flooding and several roads were also flooded.

The flow on the Sulphur River at Talco, which flows into Wright Patman Lake peaked at 13,200 cfs in April and 53,000 cfs in May. On the Big Cypress, which flows into Lake O'The Pines, the flow peaked at 4,800 cfs in April and 10,500 cfs in May. The peak releases from Wright Patman and Lake O'The Pines were 10,000 cfs and 3,000 cfs respectively, thus significantly reducing the peak inflows on the Sulphur River. Peak inflows to Wright Patman and Lake O'The Pines Lakes were recorded at 75,000 cfs and 24,000 cfs, respectively.

(d) NECHES RIVER BASIN.

Rainfall during the early spring months saturated the Neches and Angelina River watersheds and slowly raised the water level of Sam Rayburn Reservoir to elevation 165.34 or 0.94 feet into the flood pool on April 1. Flood releases were made as downstream conditions permitted and by May 1, the lake level had been reduced to elevation 164.80. Rains in late May and early June, however, cause the lake level to rise to elevation 168.39 feet or 44 percent of flood control on June 12. The peak mean daily inflow was 46,700 cfs and the peak release was 12,450 cfs.

(e) TRINITY RIVER BASIN.

All eight of the Fort Worth District lakes in the Trinity River Basin experienced significant runoff and subsequent rises in pool level due to the April and May rainfall. Of the eight flood control lakes six attained new record pool elevations and four exceeded the top of their flood control pool. At the peak of the flood, the Fort Worth District projects were storing approximately 2 million acre-feet of flood waters. The operation of the Corps lakes was instrumental in reducing downstream flows that reduced the peak stage at Dallas, Texas on the Trinity River by approximately thirteen feet.

The April 19-21 storm set the stage for the events of the next month. At this time, the upper basin received 2-3 inches of rain. This rainfall saturated the watershed and caused minor runoff which resulted in most of the lake levels approaching or going into the flood pool. The April 25-27 storm was such that much of the upper basin received 3-7 inches of rain. This event caused major flooding throughout the area, with Village Creek, the East Fork Trinity, and the Dallas area being impacted the most. The White Rock Creek area sustained significant flooding which resulted in the evacuation of homes and businesses in the Rochester Park area. The May 1-4 rainfall event caused additional significant flooding, with the mid-cities and Dallas area being impacted the most. Rainfall amounts for the Corps lakes in the Trinity River Basin for April and May ranged from 10.73 inches at Bardwell Lake to 15.25 inches at Lewisville Lake.

Runoff from these storms caused major or near record stages along the Trinity River. The Trinity River at Grand Prairie crested 4.61 feet above flood stage causing 35 homes to be flooded and the closure of numerous roads. At Dallas, the Trinity River crested at 47.08 feet (the second highest stage since records began). Numerous levee breaks occurred along the Trinity River south of Dallas near Rosser and downstream to Trinidad. These levee breaks caused flooding of approximately 20,000 acres of land the drowning of numerous head of cattle. Near Trinidad the river crested at 47.86 feet, the third highest on record. At one time, the flow in the river from Trinidad to Lake Livingston was approximately 100,000 cfs.

The following is a synopsis of the flood control operations at the Corps Lakes in the Trinity River Basin. During the April-May flooding the Reservoir Control Section was placed on twenty-four duty from April 26 through May 4 and for other shorter periods as the situation required.

BENBROOK LAKE, located on the Clear Fork of the Trinity River, was at elevation 697.16 or 3.16 feet into the flood pool on April 1. Flood releases were made as downstream conditions permitted. However, on April 25, prior to the heavier rainfall, the lake had risen to elevation 700.22. At this time, the gates were closed to control downstream flooding. By May 1, the lake had risen to 709.95 or 0.05 feet below the spillway notch crest. Additional heavy rains on May 1-4 caused the lake to rise to elevation 717.54 or 73 percent of flood control pool on May 3, setting a new record elevation. This was the second time in the last year that the project had spilled. The peak flow through the notch was 6,650 cfs far less than the peak inflow of approximately 52,000 cfs.

JOE POOL LAKE, located on Mountain Creek, was at elevation 522.46 or 0.46 feet into the flood pool on April 1. On April 25, prior to the heavier rainfall, the lake had risen slightly to elevation 522.84. By May 1, the lake had risen to elevation 527.12 or 5.12 feet into the flood pool. Additional heavy rains from May 1-4 caused the lake to rise to a record elevation of 533.21 or 77 percent of flood control pool on May 20. Peak inflow to the lake was approximately 25,000 cfs.

RAY ROBERTS LAKE, located on the Elm Fork of the Trinity River was at elevation 634.16 or 1.66 feet into the flood pool on April 1. The lake was in the initial filling period until March 25, 1990, at which time the conservation pool filled for the first time. Flood releases were initiated on April 6. A deviation from the approved Plan of Regulation was in effect until April 26 to limit the releases to 1600 cfs in order to prevent damages to the Clovis Archaeological site on the banks of the outlet works channel. On April 25, prior to the heavier rainfall, the lake had risen to elevation 636.52. On April 26, the release was increased to 4,000 cfs. The lake reached a peak elevation of 640.66 on April 27. Additional heavy rains on May 1-4 caused the lake to begin rising and the releases were increased to 7,000 cfs by May 2. The lake peaked at elevation 644.44, 158 percent of flood control pool, on May 3, setting a new record elevation. This elevation was 3.94 feet above the top of the flood control pool and only 1.06 feet below the perched spillway crest. The peak inflow to the lake was approximately 115,000 cfs.

LEWISVILLE LAKE, located on the Elm Fork of the Trinity river, was at elevation 525.33 or 3.33 feet into the flood pool on April 1. Flood releases were made as downstream conditions permitted. However, on April 25 prior to the heavier rainfall, the lake had risen to elevation 527.67. The gates were closed on April 26 to control downstream flooding. The lake reached the spillway crest on April 30. Additional heavy rains on May 1-4 caused the lake to rise to elevation 536.73 feet or 158 percent of flood control storage on May 4, setting a new record elevation. This elevation was 4.73 feet above the ungated spillway and produced an uncontrolled flow of 19,300 cfs as compared to peak inflow of approximately 200,000 cfs.

GRAPEVINE LAKE, located on Denton Creek, was at elevation 539.83 feet or 4.83 feet into the flood pool on April 1. Flood releases were made as downstream conditions permitted. However, on April 25 prior to the heavier rainfall, the lake rose to elevation 546.51. The gates were closed on April 26 to control downstream flooding. The lake continued to rise and on May 1 was at elevation 555.78. Additional heavy rains on May 1-4 caused the lake to continue to rise to elevation 562.96 feet or 116 percent of flood control storage on May 4. This was 2.96 feet over the ungated spillway with a flow of 8,040 cfs. The peak inflow to the lake was approximately 57,000 cfs.

LAVON LAKE, located on the East Fork Trinity River just upstream of Lake Ray Hubbard, was at elevation 497.61 or 5.61 feet into the flood pool on April 1. Flood releases were made as downstream conditions permitted. However, on April 25 prior to the heavier rainfall, the lake had risen to elevation 500.78. The gates were closed on April 26 to control downstream flooding. The lake continued to rise and on May 1 was at elevation 503.27 or 0.23 feet below the top of the gates. Additional heavy rains on May 1-4 caused the lake to continue to rise and surchage operation was initiated on May 2. A peak elevation of 504.93 feet or 115 percent of flood control pool was reached on May 3 with a peak outflow of 54,000 cfs and a peak inflow of approximately 90,000 cfs. This elevation was 1.43 feet above the top of the flood control pool. Both the peak elevation and outflow were new records.

NAVARRO MILLS LAKE, located on Richland Creek was at elevation 434.73 feet or 10.23 feet into the flood pool on April 1. Flood releases were made as downstream conditions permitted and by May 1 the lake level had been reduced to elevation 431.45. Heavy rains on May 2 and 3 caused the lake to rise to a record elevation of 438.61 feet or 69 percent of flood control pool on May 20. The peak inflow to the project was approximately 32,000 cfs.

BARDWELL LAKE, located on Waxahachie Creek was at elevation 424.55 feet or 3.55 feet into the flood pool on April 1. Flood releases were made as downstream conditions permitted and by April 25 the lake level had been lowered to elevation 423.82. However, heavy rains on April 26-28 caused the

lake to rise to elevation 434.54 or 70 percent of flood control pool on May 23, setting a new record elevation. The peak inflow to the lake was approximately 20,000 cfs.

(3) DEVIATIONS FROM WATER CONTROL PLANS.

During the year, the Fort Worth District requested twenty-two deviations from the approved Water Control Plans for its lake projects. In general these deviations were requested because of drownings, construction work, protection of archaeological sites, and hazardous chemical spills. Note should be taken, however, of four requests that were made to continue high surcharge releases from gated structures in order to regain flood control storage should future rains occur. Two such requests were made for surcharge releases from Lavon Lake and two for Proctor Lake during this year's major flood event.

(4) AUTOMATION OF PROJECT WEATHER STATIONS.

In FY 1990, the Fort Worth initiated the purchase of equipment to automate the weather stations located at its lake projects. These automated weather stations will replace the existing stations and will utilize satellite telemetry to relay the information to the District office. The system will be implemented over a two-year period. Equipment to automate half of the lakes has been delivered and is being installed this calendar year. The target date for full implementation is October 1, 1991. There will be a 60-day trial period at each project with duel readings being taken for calibration and verification of data.

(5) FEDERAL AND NON-FEDERAL HYDROPOWER.

During FY 1990 construction of non-federal hydropower facilities was initiated at Lewisville and Ray Roberts Lakes. The city of Denton is the owner and will coordinate all activities with the District. In addition, the Robert D. Willis hydropower facilities (Federal) at B.A. Steinhagen Lake have been completed and the operations turned over to the Corps. The Sam Rayburn Municipal Power Agency is the sponsor and will receive all revenue from the generation.

c. GALVESTON DISTRICT. On 13 March 1990, the gates on Addicks and Barker Reservoirs were closed to store water for the Great Houston Rubber Ducky Race. Releases were made on 16 March 1990, the day before the race.

On 4 April 1990, the gates on Addicks and Barker Reservoirs were closed to store water for the 21st Annual Reeking Regatta held by the Buffalo Bayou Coalition on 7 April 1990. Releases were initiated on 6 April 1990, to provide the requested water levels for the event.

d. LITTLE ROCK DISTRICT.

(1) Rainfall over the LRD in FY90 was significantly above the yearly average at all projects. Although the first quarter of FY90 was extremely dry, the period of January through May was characterized by above average monthly rainfall. This wet period culminated in the flood in May. Pool elevation records were set at Blue Mountain and Nimrod and the White River System storage set a record high for that late in the year. June and July turned dry, allowing reservoir evacuation. The White River lakes flood pools were evacuated by mid-September.

(2) Special operations and activities related to water control projects are summarized as follows:

(a) White River System

1. As the water year began all of the projects in the White River basin were in their conservation pools. From rainfalls beginning in January all the projects reached their flood control pools by mid-February. The first major event occurred in mid-March, causing pool rises from four to six feet. In mid-April rain over the upper part of the basin caused a rise of about three feet at Beaver Lake. This was the first of several storms that passed through the White River Basin from mid-April through early June. At the beginning of May the White River System was at 25 percent full. In early May a strong rainfall event caused rises ranging from ten to thirty feet. Beaver Lake went into a surcharge operation with a maximum release of 51,000 cfs as the pool crested above the top of flood control pool. Significant rainfall ended in late May with the White River System reaching a crest of 82 percent full in mid-June. After early July little runoff was experienced over the basin, allowing the system to be evacuated by mid-September 1990.

2. There were four deviations at the White River multipurpose projects in FY90. Two were for hydropower involving the Southwestern Power Administration (SWPA). The other two were deviations in the regulation stages to accommodate the farming interests below Bull Shoals and Norfork Lakes.

3. At Clearwater Lake there were three deviations. One deviation allowed the lake to remain one foot above conservation pool to allow access to a boat ramp that required maintenance. A second deviation revised the Poplar Bluff regulation stage to six feet to minimize damage to downstream crops. The third deviation provided releases for a canoe race.

(b) Little River System.

1. Rainfall over the Little River Basin in FY90 was 9.8 inches above the yearly average. Above average rainfall in May caused a maximum rise of 19.7 feet for the tri-lakes and a rise of 7.1 feet at Millwood. The largest monthly inflows

occurred in May with rainfall of 6.8 inches above the monthly average. This resulted in maximum rises of 16.5 feet at Millwood and 39.9 feet for the tri-lakes. The maximum tailwater at Millwood was 262.0. These large rises were also due in part to the Red River flood which restricted releases from Millwood Lake and, therefore, from the tri-lakes. The flood waters were held in the tri-lakes because the flood control storage at Pine Creek and Broken Bow was higher than they were, and the intent was to try to empty the Little River System in a balanced operation. The maximum flood control storage utilized in FY90 was 64% at DeQueen Lake in May. As a result of the flooding in May several problems arose. The maximum pool elevation of 275.7 reached at Millwood before releases could be started was the highest it had been since April 1973. A gravel quarry at the upstream end of the lake was less than half a foot from being flooded when releases were started, even though the flood storage utilized was only 46%. In June, as a result of flood water still being evacuated from the Red River Lakes, the Red River was higher than normal and flood water releases were still being made from Millwood Lake. The result of this combination was water standing on an area of bottomland hardwood timber downstream of Millwood Dam, with the concern that the trees would be killed or severely damaged. The problem was solved without a deviation because by the end of June the pool at Millwood and at lakes Texoma and Hugo on the Red River were close to their conservation pools so that releases were reduced, and the water receded off of the trees.

2. There was one deviation at Millwood Lake in FY90. This was to draw the pool 0.5' to mark the boat lanes that were cleared by Arkansas Game and Fish Commission. The deviation was in effect from 27 February to 7 March 1990.

3. Releases were adjusted at Gillham Lake for a kayak and canoe race in February and for a canoe race in late May.

4. Releases were adjusted at Dierks Lake in February for a canoe race.

5. In June 1990 there was a deviation that covered DeQueen, Pine Creek and Broken Bow Lakes in order to reduce the stage at Horatio on the Little River. The stage reduction was requested by residents along the river because access to their homes was cut off by a low spot in the road. The stage was reduced and the county raised the low spot in the road.

(c) Arkansas River System.

1. During the first quarter of FY90 rainfall and flows were well below the historical averages. In late December, low stages on the White and Mississippi Rivers combined to cause navigation problems in the White River Entrance Channel (WREC). The WREC was closed to all traffic 25 - 27 December. It was then opened with restricted traffic for three days and closed again 30 December through 6 January. The total closure was 11 days, due to not only the low water, but also to a grounding in the

channel. Then, in the second quarter of FY90, the rains were above average and flows began to increase. By mid-March the flow at Van Buren was being regulated to 150,000 cfs by SWT flood releases. The heavy rains continued throughout April and May, eventually resulting in the May 90 flood. The navigation systemwas closed for 23 days in May due to high flows. SWT made releases from flood storage until mid-July. From June to the end of FY90, the Arkansas River Basin rainfall was below normal and low flow conditions were experienced during the last quarter of FY90.

2. May Flood. By mid-March the Arkansas River at Van Buren had risen above flood stage and remained there until early June. In April and May, cold fronts moving from west to east set off a series of storms that moved into Oklahoma and through Arkansas in mid to late April. On 2-4 May, 4 to 14 inches of rain fell on the saturated areas of the Arkansas River basin in Arkansas and Oklahoma. Most rain fell on 2 - 3 May. On 3 May, at 0700 hours, 3.5 to 7.5 inches of rain reportedly fell in a 24 hour period in the areas of Eufala, Wister and Van Buren. After the passage of these storms, the ground was saturated, and flood control projects on the Arkansas River filled or were rapidly filling. The storms moved through the system leaving little time between storms to empty flood control storage. SWT received a deviation for Eufaula and Tenkiller to fill-in the discharge hydrograph after the crest of the flood. By mid-May the flow at Van Buren was 150,000 cfs. The crest at Van Buren was 36.1 ft. (a peak flow of 401,000 cfs) on 5 May. At Dardanelle the crest occurred a day earlier, on 4 May, at 42.1 ft. and a flow of 433,000 cfs. The peak flow at Little Rock was 406,000 cfs at a stage of 27.6 ft. on 8 May. Pine Bluff peaked on 9 May at 47.7 ft and a flow of 403,000 cfs. The May 90 flood event was the largest event experienced on the Arkansas River since the construction of the McClellan-Kerr Navigation System. As a result of the flood, W.D. Mayo incurred damages to an overflow embankment which required emergency repairs at the end of May. In order for the repairs to be accomplished the flows had to be reduced at W.D. Mayo, which resulted in SWT obtaining a deviation to reduce the regulation flow at Van Buren for a time.

3. Regulation Difficulties During the May Flood. The first difficulty encountered by LRD during the flood involved getting reliable and timely information. Another difficulty involved the "flood switches" at the projects. The "flood switch" is supposed to switch the elevation readings from the float wells to the lock chamber without an interruption in data. However, in some cases the float wells"bottomed out" or stuck before the float well was overtopped by the rising flood water. When the project personnel noticed the float was hung in the float well, they removed the equipment and switched the "flood switch". The stage had changed several tenths or even more by the time the lock chamber equipment began recording data again. Unfortunately, the equipment in the lock chamber began recording at the elevation where the float well quit. Therefore, an error in the data was introduced when the"flood switches" were utilized. Once the "flood switch" had been utilized, headwater

elevations and precipitation were the only forms of electronic data being received from the projects. The Reservoir Control Section called the projects to get elevations at the dam, since the automated data was unreliable, or missing altogether. But even this method of gathering data was not very reliable because some of the projects were physically measuring elevations from known elevations (i.e., measuring with a measuring stick out the lock window to the sidewalk which had an established elevation). Other projects read elevations from their strip charts which were as much as a foot off because of the difficulty experienced with the "flood switches". Since the electronic tailwater elevations were missing and the headwater elevations were inaccurate, the telephone reports were the most reliable and available source of data during the flood. Obtaining and analyzing this data was time consuming because, once all the phone calls were completed, that data had to be converted to tailwater flows and then plotted manually. Finally, after the flood was over it was discovered that some of the data obtained from the telephone reports was not correct because the project personnel did not realize, or had no way to verify, the elevations recorded on the strip charts.

4. Channel Recovery Following May Flood. A deviation was approved in late May to modify the Taper Plan to use a 60,000 cfs bench at Van Buren instead of a 75,000 cfs bench for a system storage between 11% and 18%. At a system equivalent storage of 11% the taper of 40,000 cfs to 20,000 cfs began. This modification along with continued moderate rains, pool deviations and extra dredging effort resulted in a successful channel recovery following the flood. The 60,000 cfs bench improved conditions for surveys and reconnaissance missions and provided more time to locate shoals and plan dredging strategies.

5. Taper Options Initiated. In Oct 89 SWD approved a deviation from the Arkansas River Basin Water Control Plan and initiated the use of Taper Options A, B, and C for future use by LRD and SWT. In Options A, B, or C, predescribed conditions are established in which LRD & SWT may agree on and exercise a specific option to deviate from the standard Taper Plan. Trial 1 of Option B was approved on 4 Oct 89. There were no other Taper Options trials utilized during FY90.

6. Deviations. LRD had one deviation approved that modified the Taper Plan of the Arkansas River Water Control Master Manual. The deviation was approved after the flood in May to aid in the recovery of the navigation channel. Three deviations approved in FY90 were to insure navigation depths during low flow periods. Pools 13 and 7 had deviations approved during the low flow period form October '89 to February '90. The pool 13 deviation was extended in December and January in a effort to save dredging costs. A deviation was approved to raise the bottom limit at Dardanelle, Ozark, Ormond, Toad Suck, Murray and Wilbur D. Mills. A deviation was obtained for Lock and Dam 5 to provide Plum Bayou with water for irrigation from late August to mid-September.

7. Blue Mountain and Nimrod. These projects started FY90 with an extremely dry first quarter. The first three months were over 10 inches of rainfall below average. January through May experienced rainfall well above normal. By mid-March Nimrod was above 30 percent full and rising. No releases could be made due to high Arkansas River stages which pushed the stage at Houston above 34 feet. A deviation to the water control plan for Nimrod was instituted to allow releases at a 25 foot stage at Houston. This allowed releases from late March into mid-April. High stages in the downstream area prevented significant releases after 17 April and the pool filled to over 60 percent. The runoff from the storm on 1 May raised the pool further, forcing spillway and surcharge releases. Nimrod peaked at near 378, the real estate taking contour. This is the record pool elevation. Maximum releases were a record 15,800 cfs. After the pool crested the release was sustained at 12,000 cfs for approximately six days to allow recovery of 15 percent of the flood storage below the spillway. This required a deviation which was granted on 11 May. Blue Mountain was also high in its pool at almost 60 percent when the 1 May storm hit. Blue Mountain went into a surcharge operation on 3 May, reaching a maximum release of 11,812 cfs. The release was cut back to the uncontrolled spillway only, when it was reported that the release was overtopping and possibly threatening the Highway 309 bridge. Releases were, thereafter, made to clear low-steel on that bridge. This was about 6,500 cfs. The decision to cut back was made after consultation with Real Estate Division and the Resident Office. The pool crested at a new record of 425.2, 1.2 feet above the real estate taking contour. Water came within six vertical inches of one house during this event. The pool was evacuated to recover 15 percent of flood storage by the same deviation used for Nimrod. A subsequent storm on 19 May put Nimrod back over its spillway to near elevation 376, but Blue Mountain did not go back over its spillway. Nimrod was evacuated by mid-July and Blue Mountain by the end of that month. At Nimrod, a request was honored to stabilize the pool level one weekend for a fishing derby. At Blue Mountain a local request was received to evacuate at a lower stage at Danville. This deviation was to use a 12.5 foot regulation stage. It was begun on 29 June.

(3) Studies, reports and investigations related to water control are summarized as follows:

(a) White River Lakes Regulation Study. A new plan of regulation has been selected for the White River System and a preliminary review completed by SWD. The Reservoir ControlSection will address SWD's comments and submit a schedule showing necessary tasks for implementation of the plan. These tasks include a review of the existing Environmental Impact Statement, completion of an environmental assessment, final review with SWD and then coordination with the general public and other federal agencies. It is anticipated that the new plan of regulation will be implemented by the end of FY91.

(b) Table Rock Dissolved Oxygen Study. Studies by the Waterways Experiment Station (WES) recommend the use of in-lake hypolimnetic oxygen (hyp-ox) injection to meet the targetwater quality standards for the Table Rock hydropower releases. WES is currently doing the preconstruction studies needed to design, locate, and size a hyp-ox system for Table Rock. The current schedule is for submission of a report in early FY 91.

(c) Development of Norfork Unit Number 3. The City of Conway, Arkansas, has been tentatively selected as the sponsor for Federal construction of an additional unit at Norfork Dam. When approved, the Conway Corporation will provide financing for the design, construction and operation and maintenance of the project in exchange for a power allocation from SWPA. The Corps will be responsible for approving and performing the design, construction and operation of the project. In May 1990 the draft feasibility report was submitted for approval along with a request to accept sponsor contributed funds.

(d) The Arkansas River Basin Study

1. This study was a general investigation study. The cost-sharing agreement with the states of Arkansas and Oklahoma and the Little Rock and Tulsa Districts was completed in July 1987. The study, which includes navigation and non-navigation components, recommended no new projects. The study found that Arkansas River water usability studies indicated the river water quality is much improved and is suitable as a raw water source for municipal, industrial, and agricultural purposes. Whether it is the best source of water for a specific purpose must be determined on a site-specific basis.

2. The levee reconstruction studies indicated that major replacements and repairs to 11 existing Arkansas River levees were economically feasible. However, it was determined during the course of the study that reconstruction of existing levees is not in the Federal interest. Non-federal sponsors are seeking relief on this issue.

3. The system operating plan studies indicate that, without significant additional storage in the system, the benefits and impacts of all three operating plans investigated are very similar. However, an alternative operating plan was found to provide more suitable days for navigation while utilizing less of the Oklahoma flood control storage. The feasibility report is scheduled for public review and comment in October 1990.

(e) The Arkansas River Land Impact Study. The study was initiated as a result of numerous complaints concerning the frequency and duration of flooding along the main stem of the Arkansas River. The study objective is to identify any lands where additional real estate acquisitions are required. The results of these investigations are being reported in a summary letter report and also in a Real Estate Design Memorandum

Supplement for each pool where additional real estate actions are required. Study results indicate that additional flowage easements will be required on all pools except Dardanelle and Ozark. For pools not requiring real estate action data supporting this finding will be forwarded for review in the form of a Hydrologic and Hydraulic Report. The study began in March 1986. The letter report was completed in September 1989 and is in OCE for review. Studies on tributaries to the Arkansas River were initiated. The first tributary studied was Tupelo Bayou in Pool 7. This study has been completed and revealed a need for additional real estate acquisition. Studies on the Petit Jean River in Pool 9 are currently being made. The Real Estate Design Memorandum Supplements are tentatively scheduled to be completed in 1991.

(f) White River and Tributaries, Arkansas. The study is a general investigation study of the impacts of Little Rock District reservoir operations on navigation in, and recreation activities on, the White River and its tributaries in Arkansas during low-water periods. It has been requested that water releases for the White River reservoirs be modified to augment flows for navigation and recreation. Many times in the summer and fall navigation on the White River is delayed. This increases shipping costs for agriculture and other commerce in the region. Recreational interests are concerned with the effects that low flows have on the trout fishery and the other recreational uses of the river. A reconnaissance report was completed in September 1989. Negotiations for the cost shared feasibility study are under way.

(g) Montgomery Point Lock and Dam. Low water levels in the Mississippi River at the mouth of the White River cause delays in navigation and increased dredging costs in the White River Entrance Channel of the McClellan-Kerr Arkansas River Navigation System. Results received from the Waterways Experiment Station indicate that the only feasible solution is a new lock and dam. Additional testing has confirmed that the most economical location is in the White River Entrance Channel at approximately mile 0.6. The current cost estimate of the project is $163.5 million. The present schedule calls for submission of a Feasibility Report to Congress in November 1990 with a public review of the draft report occurring in September 1991. The Project Design Memorandum is scheduled for completion in November 1992.

(h) Wilbur D. Mills Dam (LD#2) Stilling Basin Enlargement. This dam has a history of erosion of the riprap scour protection downstream from the stilling basin, requiring numerous intermittent repairs. Since the dam is constructed on piling, extensive scour could cause the structure to fail. Physical model studies of several possible permanent solutions to the scour protection problem were done at the Waterways Experiment Station. A plan which involves sinking barges filled with grouted riprap downstream from the stilling basin end sill

was selected as being the most cost effective while still providing the required protection. A construction contract was awarded in June 1990 for a FY90 construction start.

(i) Non-Federal Hydropower Development. In FY90 the hydroelectric powerplants at James W. Trimble Lock and Dam (No.13) and Murray Lock and Dam (No. 7) continued to operate. The lock and Dam No. 13 powerplant contains three 10-megawatt (MW) hydroelectric generating units and Lock and Dam No. 7 contains two 19.5 MW units. Construction of the hydroelectric powerplant at the Arthur V. Ormond Lock and Dam (No. 9) began in August 1990 and is scheduled to be completed in 1994. This plant will contain three 10.6 MW units, have a maximum power release of approximately 31,500 cfs, and be operable at river flows between 3,000 and 150,000 cfs. Licenses have also been issued at Lock and Dam No. 3, Wilbur D. Mills Dam (No. 2) on the Arkansas River, and Nimrod Dam on the Fourche LaFave River, a tributary of the Arkansas. LRD continues to be responsible for reviewing preliminary permits and applications filed with the Federal Energy Regulatory Commission (FERC) for development of non-federal hydropower at Corps projects or non-Corps projects within the limits of LRD to ascertain potential impacts on Corps responsibilities. The Corps also has the responsibility to review all designs, plans, and specifications for features which affect the integrity of the existing Federal structure or its operational adequacy.

(j) Drought Contingency Plans. The White River Basin and Little River Basin Drought Contingency Plans (DCP) were submitted to SWD for approval in early FY90. The draft Arkansas River Basin Plan was also submitted in early FY90. A meeting was held at SWD to discuss the draft DCPs for the Arkansas River. All DCP's are scheduled for approval in FY91.

(k) Gillham Gate Tower Vibration Investigation. Due to the above average rainfall in May and the flooding on the Red River, the pool elevation at Gillham Lake reached elevation 544.85. Personnel from the Waterways Experiment Station went to Gillham to perform tests and collect data on the gate tower vibration problem. They were at the project from 4 June to 9 June 1990. Funding was available to get the research team and their equipment to Gillham, do the testing and data collection, and then return them home. Due to budget constraints, it is uncertain when analysis of the data will be completed and a solution formulated for the vibration problem.

(l) Central Arkansas Study. This study is a general investigation study. An assessment was made in central Arkansas of the availability and usability of water and the feasibility of allocation or reallocation of water supply storage in existing Corps projects. Of the plans investigated, the reallocation of flood control storage at Greers Ferry lake to augment flows on the Little Red River to be used for agricultural water supply, recreation and fishery purpose was found to be economically

justified. Feasibility investigations have been postponed pending the results of other related studies. The reconnaissance report was completed in April 1990.

(m) White River Basin Master Manual. The White River Basin Master Manual update was submitted to SWD for review in September 1990. The manual reflects the operating scheme developed in the White River Regulation Study.

(4) Construction related to water control projects areas follows:

(a) Beaver Dam Seepage Control. Supplement 1 to the Beaver Dam Safety Assurance Reconnaissance Report, completed in April of 1986, recommended that a cutoff wall be constructed through Dike 1. A contract for construction of a concrete cutoff wall was awarded in June 1989. Start of construction was delayed due to a protest, which was denied in September 1989. Notice to proceed (construction) was issued in October 1989 and a pre-construction meeting was held on 14 November 1989 at the Beaver Resident Office. Construction of an earthwork platform on the upstream slope of Dike 1 began in February 1990. Earthwork was completed in July 1990 and excavation of the cutoff wall trench was initiated at that time. The contractor has been having difficulty in cutting the trench through rock. The deviation of top of flood pool at elevation 1128.0 NGVD in lieu of 1130.0 NGVD, with the stipulation that water not be held above 1125.0 NGVD in excess of four days, remains in effect.

(b) Clearwater Spillway and Seepage Construction. A Reconnaissance Report (May 1986) recommended that seepage be corrected using placement of material excavated from the spillway area, thereby increasing the spillway adequacy at the same time. Also recommended was the addition of a concrete parapet wall along the crest of the dam. Construction commenced in November 1986 and was completed September 1989.

(c) Table Rock Oxygen Injection System. Low dissolved oxygen concentrations in turbine releases during natural thermal stratification of the lake will be elevated with liquid oxygen (converted to gaseous oxygen) injected into the penstocks. An automatic injection system was designed and installed in 1989. The system installation was not completed during periods of low dissolved oxygen so only partial testing was completed in 1989. The system was restarted during 1990 and was in operation briefly. Equipment failures have delayed full implementation of the automatic system, however the automatic system is in partial use. It is anticipated that the system should be completely functional during October 1990. Load restrictions are being imposed until the system is fully operational.

(d) Arkansas/White River Containment Structure. A new channel is developing between the Arkansas and White Rivers. Should this new channel develop, the sand laden flows from the Arkansas River could be carried to the White River. This

sediment would have to be dredged from the White River at an estimated annual cost of approximately $3.1 million. The construction of an overflow extension to the containment structure along the White River Entrance Channel has been approved. A construction contract was awarded in June 1989. Construction is expected to be completed in FY91

(e) Artificial Intelligence. The Corps of Engineers Construction Engineering Research Laboratory (CERL) is developing an Artificial Intelligence (AI) program for David D. Terry Lock and Dam. The purpose of the AI program is to provide an expert information base for eventual automation of spillway gate operations. The schedule for total completion of the automation of operation of the Arkansas River prcjects will depend on the budget, however the engineering work for the present contract should be completed March 1991 and an installation contract awarded no later than May 1991.

(5) Other significant items relating to water management activities are as follows:

(a) Water Control Data System (WCDS). Reservoir Control personnel are utilizing applications software developed by LRD to enter all daily reservoir data not available from DCP's(Data Collection Platforms), perform water budget computations, and prepare daily reports and forecasts. The DCP data are currently being retrieved from the National Environmental Satellite, Data and Information Service (NESDIS) downlink. Historical data has also been loaded into the DSS data base to provide a complete record of pertinent information for all projects and major streams. DCP data are being stored in the Data Storage System (DSS), a data base developed by the Hydrologic Engineering Center (HEC). Modifications continue to be made to the system to more fully utilize DCP data and,thereby, minimize the project reporting requirements for daily reservoir data. Applications programs from HEC and modifications of those programs allow users to view, edit, and plot the data and to generate reports. Software has also been installed to graphically display rainfall data using programs developed by the Tulsa District. Additional software which was developed last year included new programs to produce lake summary data for this report and a flow forecasting program for the Arkansas River. New Ethernet equipment was procured last year to begin networking terminals into the Harris computer as planned in the revised WCDS Master Plan completed last year.

(b) Data Collection Platform (DCP) Status. During FY90, changes were made to receive data from the NOAA/NESDIS Automatic Processing System (DAPS) instead of the old Data Collection System (DCS) which was phased out. The Little Rock District (LRD) currently has a total of 96 DCP stations with 39 located in the Arkansas River basin, 13 in the Little River basin and 44 in the White River basin. Of these, 32 are maintained by LRD. LRD also uses 39 stations outside the LRD area in conjunction with real-time activities.

(c) Automation of Field Operations and Services(AFOS). LRD is currently receiving AFOS system data from the National Weather Service (NWS) Tulsa River Forecast Center through a line that also provides data to the Tulsa District and SWD. Selected products are routed to the TOTAL data base, DSS data base, and to a printer, while others can be viewed with the VUENWS program. Current software has been added to allow utilization of AFOS graphics products as well.

(d) Monthly Charts Process Revision. Work is approximately 85% complete on revising the process by which the Monthly Charts are produced. The new procedure will include utilizing the data in the WCDS DSS archive files by using several of the HEC DSS utility programs. The procedure will allow the user to build a monthly summary, edit the data if necessary, adjust inflows where applicable and then produce the final Monthly Chart. Work should be complete on the new procedure early in FY91.

(e) White River Coordinating Committee. A committee with representatives from 30 organizations and agencies in Arkansas and Missouri was formed in FY90 for the purpose of improving communication and understanding among the various users of the White River. The initial meeting of the committee was in April 1990. The committee meets twice yearly under the leadership of the District Commander.

(f) Natural Disaster Exercises. Two natural disaster exercises simulating flood conditions were conducted in FY90. The first, in October, was designed to test the response and recovery capabilities of the District and Resident Offices. The exercise identified inconsistencies in the emergency notification procedures published for use within the District. A planned test of response to a simulated structural dam failure was not conducted due to confusion over the compressed time scale of the exercise. A follow-up exercise was scheduled to include this scenario in March. The March flood exercise included simultaneous floods on the White and Arkansas Rivers and a simulated structural failure of the Clearwater project. The exercise scenario and supporting hydraulic data provided a realistic setting and was instrumental in achieving a meaningful test of the emergency response system. This exercise pointed out the need for hydraulic engineering units of measure familiarization training among EOC staff personnel. This issue is being addressed in FY91.

e. TULSA DISTRICT.

(1) ARKANSAS RIVER BASIN.

(a) Flood Control Operations. For FY 90 the flows in the Arkansas River at Van Buren were about 160 percent of normal. Nearly 70 percent of the annual flow of 42.4 million acre-feet occurred during March, April, and May. The average flow during those three months was 160,000 c.f.s. The equivalent basin storage peaked at nearly 80 percent in mid-March. From 12

March through 10 June, the Van Buren stage was above 22 feet for all but six days. Very heavy rains in the Arkansas Basin generally south of Muskogee in late April and early May resulted in a peak flow at Van Buren of about 400,000 c.f.s., the highest since October 1959. The stage crested at 36.1 feet on 5 October. Record high pools were experienced at Eufaula, Wister, Arcadia, Skiatook, and Lake Thunderbird. Eufaula crested at elevation 599.77, 0.23 feet from the top of the induced surcharge pool with a peak outflow of 230,000 c.f.s. Wister crested at elevation 508.09, 5.59 feet above the top of the flood control pool with a peak outflow of 25,000 c.f.s. Deviations were approved to allow for a more rapid evacuation of the system flood control storage following the flood crest at Van Buren while maintaining a continuously falling stage. A more through description of the District's activities during the April-May flood is presented in "After Action Flood Report, April-May 1990," dated August 1990.

(b) Special Operations.

Keystone Lake. The Tulsa District was engaged in the negotiation of a U.S. Fish and Wildlife Service Opinion on the least tern in the Arkansas River channel. Personnel from Planning Division, Operations Division, and Reservoir Control Section monitored the tern nesting sites between Kaw Dam and Muskogee, Oklahoma.

Wister Lake. The seasonal rise in the pool elevation for fish and wildlife recreation enhancement was foregone this year to facilitate the major rehabilitation work on the embankment.

Fort Gibson and Eufaula Lakes. Special low-flow releases were made from both projects through the summer months to ensure adequate dissolved oxygen levels in the stilling basins to prevent fish kills.

W.D. Mayo Lock and Dam. Extended periods of high flows during the spring months resulted in significant damage to the left overflow dike. A deviation was approved in May to reduce the flows on the Arkansas River to facilitate repairs of the damaged section. The repairs were accomplished by District forces.

(2) RED RIVER BASIN.

(a) Flood Control Operations. Flows in the Red River Basin during FY 1990 averaged about 225 percent of normal. Precipitation averaged about 150 percent of normal. Rainfall was much above average throughout most of the basin during January through May 1990. Very heavy rains in the Red River Basin in late April and early May resulted in a peak flow at Index, Arkansas, of about 276,000 c.f.s., the highest since 1938. The stage at Index crested at 32.25 feet on 10 May. Record high pools were experienced at Arbuckle, Lake Texoma, McGee Creek, Sardis, Hugo and Broken Bow.

Lake Texoma crested at 644.76 feet, 1.76 feet above the top of the induced surcharge pool and 4.76 feet above the crest of the uncontrolled spillway, with a peak outflow of about 145,000 c.f.s. Hugo crested at 439.96 feet, 2.46 feet above the top of the flood control pool, with a peak release of about 35,000 c.f.s.

Upper Red River. In the upper Red River Basin, the Waurika Lake flood control pool was filled, reaching a maximum elevation of 962.47 feet NGVD, the second highest pool of record. Within thirty-three days, 13.5 inches of rain had fallen on the Waurika Lake watershed. A maximum inflow of 24,000 c.f.s. was experienced on 2 May 1990. The maximum release from Waurika Lake during this flood control operation was 2,600 c.f.s. from 4 May to 24 May. At Arbuckle Lake, a U.S. Bureau of Reclamation project, a maximum pool elevation of 889.00 feet NGVD was reached, the highest pool of record, 3.7 feet above the top of flood pool elevation. The uncontrolled circular drop-inlet emergency spillway was used for the second time in the project's history. Within thirty days, nineteen inches of rain had fallen on the Arbuckle Lake watershed. A maximum inflow of 27,000 c.f.s. was experienced on 2 May 1990, and a maximum outflow of 3,900 c.f.s. on 3 May 1990.

The Altus Lake watershed experienced a wet April (6.73 inches basin average rainfall) and May (4.86 inches basin average rainfall). At the dam, 1.60 inches of rainfall was reported on 1 June 1990 (0.22 inches basin average rainfall), resulting in a maximum inflow of 13,700 c.f.s. on a full conservation pool. The maximum pool elevation of 1561.15 feet NGVD, and channel capacity releases of 5,400 c.f.s. were reached on 1 June 1990. The flood control storage, which filled to 71 percent of capacity, was essentially evacuated by 5 June 1990.

A deviation was verbally approved on about 6 May 1990 which allowed for a more rapid evacuation of the flood control storage at Hugo and McGee Creek. This approval was rescinded on 10 May after about 15 percent of the flood storage was evacuated at Hugo and 25 percent was evacuated at McGee Creek. A more thorough description of the District's activities during the April-May 1990 flood is presented in "After Action Flood Report, April-May 1990," dated August 1990.

(b) Special Operations.

Lake Texoma. A release of about 50 c.f.s. was made through one of the flood control gates from 31 August through 5 October. This release was made to prevent a fishkill in the stilling basin due to low dissolved oxygen levels in the water being generated from the lake.

The Lake Texoma Advisory Committee (LTAC) continued to be very active during FY 1990. Several meetings were held and the LTAC subcommittees are expected to submit recommendations for a seasonal pool plan to the Corps during FY 1991.

Broken Bow. A spillway sluice gate release ranging from 80 c.f.s. on 21 June to 250 c.f.s. on 1 October was made in conjunction with the second year of a 3-year test trout fishery below Broken Bow Dam. The releases were gradually cut back to 14 c.f.s. from 16 October through 18 October.

3. WATER QUALITY PROGRAM AND ACTIVITIES.

a. ALBUQUERQUE DISTRICT. The goals of the Albuquerque District water quality data collection program are to provide an accurate picture of lake conditions as to pH, turbidity, temperature, conductivity and dissolved oxygen. Trends are monitored to show improvement or degradation of water quality and the data collected is used to identify public health, fish and wildlife problems.

Readings are made on a monthly basis for the following parameters: surface pH, conductivity, secchi disk, dissolved oxygen, and temperature at the surface and at one-meter increments to the bottom.

This data is available in the District's Operations Office. The following is a listing of sampling locations for each project:

WATER QUALITY SAMPLING LOCATIONS

PROJECT	LOCATIONS	NUMBER
Abiquiu	Chama inflow, Canones inflow, reservoir near dam, release	4
Cochiti	Bland Canyon, reservoir near dam, release	3
Conchas	Conchas and Canadian inflow, reservoir near dam, irrigation headworks	4
John Martin	Arkansas inflow, reservoir near boat ramp, reservoir near dam, reservoir near Ft. Lyon Hospital, two Lake Hasty locations, release	7
Trinidad	Purgatoire inflow, reservoir near dam, reservoir near Carpios Ridge	3
Jemez Canyon	Inflow, reservoir near dam	2
Santa Rosa	Pecos inflow, reservoir near dam, reservoir near asphalt pit, release	4

Biological samples are tested monthly at all projects. District personnel are trained in the use of a gas chromatograph to test for dissolved nitrogen.

b. FORT WORTH DISTRICT.

(1) For FY 1990, a Water Quality Report for Georgetown Lake was completed and submitted to SWD for review and approval. Of the twenty-four projects in the Fort Worth District, water quality reports for nineteeen projects have been completed and submitted to date. Water quality reports for Waco, Whitney, Belton, Bardwell, Wright Patman and Lake O'The Pines are still pending approval by SWD. No major water quality problems of any significance have been found in any of these projects to date.

(2) In the Proctor Lake watershed, various activities such as oil field operations, septic tank usage, dairy farming and cultivated agriculture have increased in recent years. The on-going water quality data collection effort has been too infrequent to establish a base line of water quality properties or proper correlation between the lake's water quality and these various activities. A meeting sponsored by the Upper Leon Municipal Utility District was held on September 13, 1990 at Par County Club on Lake Proctor. The purpose of the meeting was to discuss the water quality monitoring plans that various agencies have underway or have planned for Lake Proctor and its tributaties and also to develop a cooperative water quality monitoring program at Proctor Lake.

c. GALVESTON DISTRICT. There were no Water Quality Activities during FY 1990.

d. LITTLE ROCK DISTRICT. The District water quality management programs are divided among the Construction-Operations Division, and Engineering Division and Planning Division by functional missions.

(1) Construction-Operations Division Responsibilities. Previous to FY90 the Permits Branch had the responsibility for the majority of the District's water quality program. The general reservoir quality monitoring has now been transferred to the Environmental Analysis Branch of the Planning Division. Permits Branch retains that portion of the program required by environmental compliance legislation and Recreation Resource Branch now conducts the part which deals with health related compliance. The various functions of the two branches are detailed below.

(a) Permits Branch.

1. Discharge Permit and Operational Monitoring. Discharge permit and operational monitoring of 34 Corps-operated wastewater treatment systems in the District is performed in accordance with National Pollution Discharge Elimination System (NPDES) permit requirements. The USGS obtains the necessary monthly samples and analyzes these for Biochemical Oxygen Demand (BOD), bacteria, and suspended solids. Operational monitoring performed twice weekly by the sewage treatment plant operators includes in some cases pH, flow, chlorine residual, dissolved oxygen, and settleability. Operational changes are recommended as necessary. Data are formatted and computer stored in Permits Branch. This program is conducted in accordance withSection 402 of the Clean Water Act which requires reporting to the Department of Natural Resources in Missouri and the Department of Pollution Control and Ecology in Arkansas.

2. Dredged Material Analysis. Periodically, a bottom sediment survey is performed at twelve locations along the Arkansas River navigation project and less frequently at other locations on other District rivers and reservoirs. Sediment and water column samples are frozen and sent to SWD laboratory for sediment, water, and elutriate analyses. The purpose of this program is to detect potential effects of dredging operations on water quality, and to have these data available for the required 404(b)(1) evaluations of future Corps and private dredging. These operations include both commercial dredging under Corps permits and channel maintenance dredging performed under Corps ofEngineers contract.

3. Pollution Complaints and Hazardous Substances. Permits Branch and Resident Offices receive calls reporting instances of pollution and hazardous substance spills. These reports are coordinated with the appropriate Federal and State officials. On occasion, Corps personnel investigate these pollution complaints to verify existing conditions and determine effects on project operations. During oil and other hazardous substance spills, Corps personnel participate in notification and other emergency measures with Coast Guard and EPA officials and when so designated, act as the Federal on-scene coordinator forthese two agencies under the National Contingency Plan. The LRD Oil and Hazardous Substances Pollution-Contingency and Spill Prevention, Containment and Countermeasure Plan was rewritten and updated as of August 1983.

4. Special Activities. Permits Branch periodically assists Engineering Division and Planning Division in obtaining samples and analyses for special water quality and planning studies. Coordination is also accomplished on studies being performed by other agencies such as the EPA, Health Department, Soil Conservation Service, etc. Cooperative water quality studies are periodically conducted with other agencies in monitoring activities authorized under Corps Section 10 and 404 permits. Permits Branch personnel are also involved on a daily basis with personnel from the Arkansas Department of PollutionControl and Ecology in the Processing of Corps permits and resolving the water quality matters arising therein.

(b) Recreation Resource Management Branch

1. Bathing Beach Monitoring. Monitoring is performed five times monthly by resident area personnel on District bathing beaches during the swimming season to insure safe bacterial quality of reservoir waters. Samples are analyzed by the Missouri and Arkansas Health Departments free of charge. A central log containing results for all projects is maintained by the Recreation Resource Management Branch. This program is administered in accordance with SWD Regulation 1130-2-9 and applicable State laws.

2. Potable Water Monitoring. Potable water supplies of the District are tested for physical, chemical, and bacterial quality. Samples are collected by resident area personnel and mailed to the appropriate health departments, which perform the analyses free of charge. When tests indicate a bacterial problem, corrective measures are immediately taken. In some cases chronic problems detected by this sampling causes wells to be replaced or reworked. This program is conducted in accordance with ER 1130-2-407 and applicable Federal and State drinking water standards for non-community water supply systems.

(2) Planning Division Responsibilities. In FY91 Planning Division will assume responsibility for the bulk of the water quality management at the District reservoirs. General reservoir water quality monitoring of all Little Rock District reservoirs other than the main stem of the Arkansas River is currently performed three times per year at six to ten stations per lake at various depths. Sample collection in the field and water quality analyses are done by USGS personnel under the Corps of Engineers Interagency Agreement. Approximately 28 parameters are measured to ascertain general reservoir water quality and to provide background data in detecting water pollution. There are no State or other Federal programs which routinely provide these data on the reservoirs operated by the Corps. Data obtained are maintained in the Planning Division, Environmental Analysis Branch and are stored in and available from STORET, WATSTORE, and annual USGS Water Resources Data Publications for Arkansas and Missouri. Data obtained are used to evaluate basic water quality and long and short term water quality changes, to identify pollution sources, and to properly manage reservoir water quality. Their evaluations include the identification of

potential pollution sources so as to enable the Corps to have meaningful input in the decision making processes of other agencies and groups with regulatory authority over basin discharges. These findings are published in Water Quality Management Reports and annual updates for each project. The Greers Ferry and Table Rock Water Quality Management Reports have been published and the Blue Mountain report in is progress. Bottom sediment samples were collected from eight LRD reservoirs in 1984 and have been analyzed for organics, nutrients, and metals. This program is conducted pursuant to ER 113-2-334.

(3) Engineering Division Responsibilities. There is no specific organization for water quality studies within the Engineering Division. Responsibility is assigned to the various elements based on the nature of the study.

(a) Reservoir Profile and Release Monitoring. Due to the special dissolved oxygen operations required at Table Rock Lake during the summer and fall months, water quality data must be obtained for operational purposes. Lake profiles are obtained monthly from June through December. This is increased to bi-weekly during the critical dissolved oxygen period, August through the autumnal overturn in December. Data obtained in the profile include temperature, specific conductance, dissolved oxygen and pH. The profiles are located approximately 1000 feet upstream of the dam. In addition to the profile, a spot measurement of the same parameters is taken below the dam at the same time. This movement indicates the quality of the release water. Although monthly water quality profiles at the other District lakes have been discontinued, these historical data are available in USGS publications and on the WATSTORE and STORET databases. Table Rock data continues to be published and made available by this same means.

(b) Special Studies. No special studies relative to water quality were conducted in the Engineering Division in FY90 other than that mentioned in paragraph 2d(3) above.

(4). Data Management. Reservoir water quality data collected and analyzed by USGS are entered into WATSTORE and STORET, the computerized data management systems of the USGS and EPA, respectively. These data are also published in the annual USGS water resources reports for Arkansas and Missouri. Results of potable water, bathing beaches, NPDES, and other monitoring are kept in computer storage, log books, or files as appropriate. Special data collection results are contained in the reports dealing with the specific subject for which data were collected.

e. TULSA DISTRICT.

(1) Pine Creek Lake, OK. The water quality report for Pine Creek Lake was completed. The report includes the analysis of data collected during FY 90 and appendices that include all other known water quality data collected by TD.

(2) Oologah Lake, OK. Field work was completed on a water quality study of Oologah Lake. The purpose of this study was to determine if coal mining activities and oil production in the watershed were affecting water quality in the lake. Water samples were collected from June through September. Sediment samples were taken from coves and analyzed for metals associated with coal mining. Sediments were also analyzed for oil and grease for an indication of oil field contamination. The final report will be completed in FY 91.

(3) Wister Lake, OK. The second summer of field work on a water quality study of Wister Lake was completed. This study was initiated in FY 89 to obtain baseline data to relate to the possible effects of the existing poultry industry on lake water quality and the potential effects of expansion of the poultry industry in the basin. Water samples were collected from July through September. The final report will be completed in FY 91.

(4) Arcadia Lake, OK. The analysis of sediment samples and fish tissue samples for heavy metals and organochlorine pesticides have been completed. The water quality field work was completed in FY 89. The final report will be completed in FY 91.

4. SEDIMENT PROGRAM AND ACTIVITIES.

a. ALBUQUERQUE DISTRICT. A new elevation-area-capacity table for Two Rivers Reservoir was adopted in Mar 1990. The sediment survey report was also completed and has been submitted to SWD for review. A new elevation-area-capacity table for Santa Rosa Lake was completed and adopted in Oct 1990. The sediment survey report is scheduled for completion in Jan 1991. A sediment survey (aerial and hydrographic) of Abiquiu Reservoir was conducted in July 1990. A new elevation-area-capacity table is scheduled for adoption in Jan 1991.

b. FORT WORTH DISTRICT. A sedimentation resurvey report for the resurvey that was completed in December 1987 for Stillhouse Hollow Lake was finalized and submitted to SWD for review and approval in October 1988 and is currently pending approval by SWD. The Brazos River Authority is interested in the final approval report of Stillhouse Hollow Lake.

Sedimentation survey work, including installation of sedimentation and degradation ranges at Cooper Lake are in progress.

c. GALVESTON DISTRICT. A sediment policy was established in 1985 by the District to provide guidance relative to settling basins or alternative control methods on inflowing streams to reduce velocity and essentially preclude the permanent deposition of sediment in the Federally-owned lands of Addicks and Barker Reservoirs. Dredging in connection with navigation is shown in the following table.

NAVIGATION PROJECTS - DREDGING

(Cubic Yards)

Project	FY 89	FY 90
Brazos Island Harbor	731,545	1,388,467
Corpus Christi Ship Channel	1,759,912	3,337,352
Freeport Harbor	1,253,637	3,568,966
Galveston Harbor & Channel	4,032,948	2,313,241
Houston Ship Channel	2,125,586	3,725,899
Matagorda Ship Channel	5,354,812	3,254,650
Sabine - Neches Waterway	1,479,988	4,641,257
Mouth of the Colorado River	- - - -	2,637,990
Trinity River and Tributaries	- - - -	755,615
Texas City Channel	- - - -	1,330,095
Cedar Bayou	633,636	- - - -
SUBTOTALS	17,372,064	26,953,532
GIWW		
Sabine River to Galveston	587,522	247,521
Galveston to Corpus Christi	8,581,996	3,429,469
Corpus Christi to Mexican Border	3,229,285	2,213,978
SUBTOTALS	12,398,803	5,890,968
TOTALS	29,770,867	32,844,500

There were no sediment activities for FY 90 due to limited rainfall within the Addicks and Barker reservoirs.

d. LITTLE ROCK DISTRICT.

(1) Summary of Activities. Suspended sediment samples are collected at 16 stations. The 247 sediment ranges on the main stem of the Arkansas River are re-surveyed as near annually as funds and survey workload permit. From October 1989 through

September 1990, there were 111 ranges scheduled for resurveying; 43 were accomplished. There are 111 ranges scheduled to be resurveyed in FY91. 56 tributary ranges are resurveyed less frequently. These are surveyed when appreciable deposits are suspected. About 50 index ranges out of 350 sediment ranges in the other 8 reservoirs are resurveyed at 10-year intervals. Index ranges are scheduled to be resurveyed at 4 reservoirs during FY91.

(2) Channel Maintenance. Dredging of approximately 3.1 million cubic yards was required in FY90. This includes 1.2 million cubic yards dredged by the Corps-owned dustpan DREDGE JADWIN following the spring flood. The remaining 1.9 million cubic yards were dredged by three contract dredges. Areas that required dredging included Ozark Lake, Lake Dardanelle, Pools Nos. 9, 8, 7, 4, 3, 2, and the White River Entrance Channel. Navigable depths were maintained following the spring flood by the favorable flows and an aggressive dredging operation. There were no blockages or restrictions during the recovery phase.

e. TULSA DISTRICT. During FY 90, a contract was awarded to perform a detailed resurvey of the degradation ranges on the Red River below Denison Dam, Lake Texoma, Oklahoma and Texas. This work is to be completed in October of FY 91 and evaluation of the condition of the river will follow. Sediment investigations of Fall River and Toronto Lakes, Kansas, was performed with the assistance of the Kansas Water Office and the results of the collected data is scheduled for completion in FY 91. Preliminary data collected on the upper reach of the Red River in Lake Texoma has been performed and additional data will be collected on the Red River along with data on the Washita River to evaluate the sediment inflow into the lake due to the 1990 flood. Suspended sediment samples were collected by the U.S. Geological Survey at 39 sites.

Sediment estimates and forecasts are being performed as needed. The historical sediment data on the Waterways Experiment Station Honeywell computer has been transferred to the Tulsa Hydrology-Hydraulics Branch Harris computer. Review of the transferred data is underway and completion of this work is estimated to be 60 days. One computer program remains to be converted to the inhouse computer system and progress is continuing. This work is expected to be completed in early FY 91. The manufacturer's hydrographic survey system software has been replaced by a more enhanced software package developed by Tulsa District. The new software is user-friendly and provides the district with greater hydrographic survey capabilities in performing this service for the division.

Hydrographic surveys were conducted on Fall River and Toronto Lakes, Kansas, Lake Texoma, Oklahoma and Texas, and the stilling basin of Fort Gibson Lake, Oklahoma, for Tulsa District and Abiquiu Lake, New Mexico, for Albuquerque District. The hydrographic survey of the Fort Gibson Lake stilling basin was to develop a contour map of the river bed. This information is being used to determine dredge quantities of the river for the

installation of the two additional generating units in the powerhouse. The contract for processing the 1985 sediment resurvey data of Wister Lake, Oklahoma, was completed in December 1989. The contract for re-evaluating the segmental areas of Lake Texoma was completed in January 1990 and this effort led to the completion of processing the 1985 sediment resurvey of the lake. Other sediment data completed during FY 90 were the 1977 resurvey of Oologah Lake, Oklahoma, and the 1989 resurvey of El Dorado, Lake, Kansas. The completed Reservoir Sediment Data Summaries for El Dorado, Oologah, Wister and Lake Texoma have been forwarded to the division office.

5. NAVIGATION ACTIVITIES.

a. ALBUQUERQUE DISTRICT. N/A

b. FORT WORTH DISTRICT. N/A

c. GALVESTON DISTRICT. Consolidated statement of tonnage handled by ports and moving on the Gulf Intracoastal Waterway is shown in the following table for calendar years 1987 and 1988.

(SHORT TONS)

		CALENDAR YEAR 1987	CALENDAR YEAR 1988
1.	Houston, Texas	112,546,187	124,886,883
2.	Corpus Christi, Texas	53,539,806	57,931,945
3.	Texas City, Texas	37,233,420	42,746,698
4.	Beaumont, Texas	29,758,759	31,947,319
5.	Port Arthur, Texas	2,615,945	23,801,409
6.	Freeport, Texas	13,980,280	15,137,891
7.	Galveston, Texas	8,684,216	12,354,709
8.	Port Lavaca-Point Comfort	4,995,099	5,061,695
9.	Channel to Victoria, Texas	3,655,454	3,562,336
10.	Chocolate Bayou, Texas	2,750,380	3,526,758
11.	Brownsville, Texas	1,234,039	1,237,027
12.	Orange, Texas	771,673	657,627
13.	Sabine Pass Harbor, Texas	722,151	1,248,308
14.	Harlingen, Texas (Arroyo Colorado)	718,645	753,937
15.	Colorado River, Texas	693,885	682,328
16.	Johnsons Bayou, La.	587,745	839,594
17.	Dickinson, Texas	420,062	722,645
18.	Sweeny, Texas (San Bernard River)	360,272	480,519
19.	Port Isabel, Texas	298,789	318,466
20.	Cedar Bayou, Texas	247,093	275,458
21.	Rockport, Texas	23,678	2,336
22.	Channel to Aransas Pass, Texas	14,445	84,325
23.	Port Mansfield, Texas	11,949	3,909
24.	Anahuac, Texas	2,850	3,033

25.	Channel to Liberty, Texas	2,850	4,433
26.	Clear Creek, Texas	-	-
27.	Double Bayou, Texas	-	2,850
28.	Palacios, Texas	-	-
	TOTAL	293,869,672	328,274,438

Gulf Intracoastal Waterway, Texas: (Traffic on Waterway)		
Sec. 1. (Sabine River to Galveston)	47,401,050	46,942,071
Sec. 2. (Galveston to Corpus Christi)	23,809,550	23,055,688
Sec. 3. (Corpus Christi to Mexican Border)	1,723,040	1,862,826
TOTAL	72,933,640	71,860,585

PRELIMINARY AND SUBJECT TO REVISION

d. LITTLE ROCK DISTRICT. Projections indicate that about 9.0 million tons of commerce will be moved on the McClellan-Kerr Arkansas River Navigation System in CY90. This represents an increase of 7 percent over the CY89 level. Commodities moved consisted of iron and steel, chemicals and chemical fertilizers, petroleum products, coal, sand and gravel, rock, soybeans, wheat and other grains, and miscellaneous commodities. Inbound movements are predicted to increase by 9 percent and outbound movements will remain about the same.

	1989* (Tons)	1990** (Tons)
Inbound	2,172,721	2,400,000
Outbound	3,840,761	3,800,000
Internal	1,907,761	2,200,000
Through	436,192	600,000
Totals	8,357,435	9,000,000

* Unofficial figures
** Projected figures

e. TULSA DISTRICT. Commercial movements in Oklahoma for FY 90 remained virtually unchanged (0.31% inc.) over the tonnages moved in FY 89. The FY 90 tonnages were very strong in view of the severe reductions in traffic due to prolonged high flows and severe flooding experienced on the Navigation System this past spring. May 1990 was particularly poor with the lowest monthly movement of tonnages since October 1986. March and April were also lower than normal monthly tonnages. Chemical fertilizer, wheat, petroleum products, and iron and steel continue to be the leading commodities shipped on the waterway. Movements of military equipment on the system continues to be a growth item for the navigation industry. The following table provides the total tonnage for FY 89 and 90 for both the Little Rock and Tulsa Districts.

MCCLELLAN-KERR ARKANSAS RIVER NAVIGATION SYSTEM
(Total Tonnage Little Rock and Tulsa Districts)

	FY 1989 * (Tons)	FY 1990 * (Tons)
Inbound	2,233,028	2,162,891
Outbound	3,764,409	3,669,273
Internal	1,756,897	2,228,908
Through	447,506	488,648
Totals	8,201,840	8,549,720

* Unofficial Figures

6. Cooperative Programs.

a. ALBUQUERQUE DISTRICT. The Cooperative Stream Gaging Program with the U.S. Geological Survey covered 39 stations in FY 90. Station costs are summarized on page VI-53. Total program cost was $179,325. The following is a summary of stations by river basin:

STATION SUMMARY

RIVER BASIN	River	RESERVOIR	TOTAL
Arkansas	3	2	5
Canadian	2	2	4
Rio Grande	9	8	17
Pecos	9	4	13

Note: 5 gages are not associated with project operation.

b FORT WORTH DISTRICT.

(1) National Weather Service. Funds were transferred by CESWF to the NWS in the amount of $92,616 for FY 1990. Under ongoing programs, the Corps collects rainfall at project offices while the NWS collects all other rainfall reports and maintains weather stations, including those at Corps' projects. Rainfall summaries are transmitted to the Corps via telephone and a daily computer printed map which displays current totals for reporting stations, supplemental and accumulative storm total printouts are provided upon request. Additional hydrometeorological information was received from NWS via AFOS. Radar scans were obtained on a Kavouras radar acquisition access and display terminal via a direct connection to the NWS Stephenville radar site (which covers the geographic area where the majority of the District's projects are concentrated). Continuous updates are possible during storm periods.

(2) U.S. Geological Survey.

a. General.

The USGS performed maintenance and operated all streamflow, lake level, and some water quality stations in cooperation with the Fort Worth District. They arranged for reporting at river stages during flood events, made supplemental flow measurements, and processed all published data. In addition to the cooperative streamgaging program, the USGS under memorandum of agreement provided operation and maintenance service to the Fort Worth District Data Collection Platform network.

b. Funds.

The Fort Worth District transferred to the USGS, for the Cooperative Stream Gaging Program, $751,850 for FY 1990. The table on page VI-54 indicates the number of stations and the funds provided by both the USGS and the COE toward the total station costs.

c. GALVESTON DISTRICT.

(1). U. S. Geological Survey - Two cooperative programs are currently in existence with the USGS. One provides the operation and maintenance of stream gages and the second provides the operation and minor maintenance for Data Collection Platforms. The total program cost for FY 90 was $186,870. The total program cost for FY 91 will be $191,090. Station costs are summarized on page VI-55.

(2). National Weather Service - The cooperative program with the NWS provides for the operation and maintenance of precipitation gages and for the transmission of rainfall summaries. The total program cost for FY 90 was $6,785. The total program cost for FY 91 is not available at this time.

d. LITTLE ROCK DISTRICT. Approximately 215 rainfall and/or river stage reporting stations were operated by the National Weather Service in or near the Little Rock District. Of these, 83 stations are in the Little Rock District Corps of Engineers/National Weather Service Cooperative FC-16 Network. The remaining stations are either operated within the National Weather Service networks or the other cooperative networks of the surrounding Corps districts. Reports from these stations are used in forecasting stream flows for flood warnings and operation of reservoir projects. There were eight LARC rainfall gages installed in southern Missouri this fiscal year with the installation of one additional gage to be completed in early FY91. Five of these are additional new stations. The estimated cost for installation of the nine LARC gages is $30,000. This cost was met by interagency agreements between the National Weather Service (NWS) and COE. The FY90 total operational and

maintenance cost for the NWS/COE cooperation program was $42,767. The FY91 operation and maintenance cost of the cooperative program is projected to be approximately $43,000.

(2) The streamgaging data required by the District is collected under a cooperative agreement with the USGS. During the fiscal year 114 stations were operated of which 96 were DCP's. Of these, 74 were operated cooperatively and 40 were operated by the Corps of Engineers. The FY90 total cost for collection of streamflow and sediment data was $581,715 of which $416,080 was transferred to the USGS. The FY91 cooperative program cost is estimated at $589,950 of which $424,590 will be transferred to USGS. Station costs are shown in page VI-56.

e. TULSA DISTRICT.

(1) National Weather Service. Real-time water control and investigation and design of our water resources projects require the measurement and reporting of rainfall and evaporation data. These data are provided through a cooperative program with the National Weather Service. During FY 90, the rainfall and evaporation program in the Tulsa District cost $130,957 through transfer of funds to the National Weather Service.

(2) U.S. Geological Survey. Much of the information required for water control, hydrologic investigation, and design of water resources projects results from the reporting and measurement of flow, water quality, and sediment provided by a cooperative stream gaging program with the USGS. During FY 90, this cooperative program included 195 stations, 26 other stations were operated independently by the Corps of Engineers. The stream gaging program in the Tulsa District cost $1,600,700 in FY 90 with $1,039,064 of this being transferred to the USGS for operation of stations and data publications as shown in Table VI-11. The total CE/USGS program cost for FY 1991 will be $1,040,000. Station costs are shown in page VI-57.

7. ANNUAL FLOOD DAMAGES PER RIVER BASIN PREVENTED BY BOTH CORPS AND SECTION 7 PROJECTS.

a. ALBUQUERQUE DISTRICT. The following is a listing of damages prevented by Corps and Section 7 projects during FY 90.

Damages Prevented in Thousands of Dollars

Basin	Project	FY 90 Damages Prevented	Cumulative Benefits Through FY 90
Arkansas	John Martin	0	87,609
	Pueblo	0	2,852
	Trinidad	0	0
Canadian	Conchas	0	81
Rio Grande	Abiquiu	0	229,368
	Cochiti	0	249,834
	Galisteo	0	0
	Jemez Canyon	0	10,639
	Platoro	0	4,508
	Rio Grande Fldw.	0	44,011
	Alb. Div. Channel	40,687	120,967
Pecos	Santa Rosa	0	13
	Sumner	0	0
	Two Rivers	1,844	7,077
	Brantley	0	0
San Juan	Navajo	0	50
	Total	42,531	758,853

b. FORT WORTH DISTRICT. Annual flood damages prevented by river basin and project for both Corps' and Section 7 lakes are shown in the following table. The table presents the damages prevented for both FY 1990 and the cummulative through FY 1990.

ANNUAL FLOOD DAMAGES PREVENTED

PROJECT	FY 90 DAMAGES PREVENTED (in $1,000's)	CUMMULATIVE BENEFITS THROUGH FY 90 (in $1,000's)
BRAZOS RIVER BASIN		
AQUILLA	$ 3,460	$ 7,028
BELTON	1,549	128,268
GEORGETOWN	0	5,363
GRANGER	2,299	20,483
PROCTOR	22,632	31,860
SOMERVILLE	507	33,484
STILLHOUSE	59	28,086
WACO	10,062	76,695
WHITNEY	23,762	183,792
BASIN TOTAL	$ 64,330	$515,059
COLORADO RIVER BASIN		
HORDS CREEK	$ 0	$ 937
O. C. FISHER	0	2,376
BASIN TOTAL	$ 0	$ 3,313
GUADALUPE-SAN ANTONIO RIVER BASIN		
CANYON	$ 0	$ 58,878
SAN ANTONIO	0	117,515
BASIN TOTAL	$ 0	$176,393
NECHES RIVER BASIN		
SAM RAYBURN	$ 1,945	$230,533
RED RIVER BASIN		
LAKE O' THE PINES	$ 1,999	$ 6,827
WRIGHT PATMAN	0	13,859
BASIN TOTAL	$ 1,999	$ 19,686

TRINITY RIVER BASIN		
BARDWELL	$ 115	$ 9,183
BENBROOK 1/	858,087	960,652
BIG FOSSIL	0	7,848
GRAPEVINE	511,914	1,494,436
JOE POOL	91,649	119,342
LAVON	13,816	124,461
NAVARRO MILLS	1,183	29,350
RAY ROBERTS-LEWISVILLE 2/	2,528,053	2,710,074
BASIN TOTAL	$4,004,817	$5,455,346
COLORADO RIVER BASIN 3/		
MARSHALL FORD	$ 0	$ 191,416
TWIN BUTTES	0	418
BASIN TOTAL	$ 0	$ 191,834
GRAND TOTAL	$4,073,091	$6,400,330

1/ Includes Fort Worth Floodway System.
2/ Includes Dallas Floodway System.
3/ Built by Bureau of Reclamation but under Corps of Engineers Flood Control Jurisdiction.

c. GALVESTON DISTRICT. Damages prevented for river and stream projects were impacted by slightly above normal rainfall. The cumulative total of flood damages prevented at the Addicks and Barker projects is $250,148,000. The cumulative total of flood damages prevented for all Corps projects in the District is $925,698,000.

	Flood Damages Prevented ($000) Total for FY 90	Cumulative Total
Addicks and Barker	$27,960	$250,148
Brays Bayou	2,134	213,771
White Oak Bayou	178	21,181
Lavaca-Navidad Rivers	0	637
Tranquitas Creek	0	5,333
San Diego Creek	0	2,908
Texas City, Texas (Hurricane-Flood)	0	10,614
Colorado River, Matagorda	0	844
Galveston Seawall	0	400,000
Vince Bayou	1,740	6,262
Port Arthur (Hurricane-Flood)	0	6,000
Freeport (Hurricane-Flood and Tide Gate)	0	8,000
Highland Bayou	0	0
Nueces River (Three Rivers)	0	0
Total	$32,012	$925,698

d. Little Rock District. The annual flood damages prevented by river basin during FY90 in the Little Rock District are shown in the following table.

Basin	FY 90 Damages Prevented
Arkansas River	
Little Rock District projects	$142,796,000
White River	
Little Rock District projects	39,861,000
Little River	
Little Rock District projects	3,238,000
TOTALS FY90	$ 185,895,000

e. TULSA DISTRICT. Flood damages prevented by the Tulsa District Lakes in the Arkansas and Red River Basins during FY 1990 are shown in the following table and amount to $265,986,000.

ARKANSAS RIVER BASIN	FY 1990	THRU FY 1990
Arcadia	-	1,065,000
Big Hill	-	483,000
Birch	2,448,000	14,915,000
Canton	55,000	8,540,000
Cheney	-	14,507,000
Copan	36,920,000	172,479,000
Council Grove	385,000	18,234,000
El Dorado	4,000	15,277,000
Elk City	1,242,000	62,867,000
Eufaula	11,409,000	100,401,000
Fall River	650,000	44,637,000
Ft. Gibson	1,755,000	50,751,000
Fort Supply	-	3,171,000
Great Salt Plain	-	39,952,000
Heyburn	1,640,000	9,325,000
Hulah	58,770,000	312,693,000
Iola Levee	1,190,000	15,924,000
John Redmond	6,175,000	95,289,000
Jenks	-	2,618,000
Kaw	6,248,000	276,456,000
Keystone	29,730,000	442,605,000
Marion	-	37,965,000
Markham Ferry	478,000	9,393,000
Norman	3,158,000	17,814,000
Oologah	7,295,000	111,136,000
Optima	-	11,000
Pensacola	340,000	51,734,000
Sanford	-	162,000
Skiatook	10,675,000	61,984,000
Tenkiller	7,400,000	26,713,000
Toronto	1,289,000	46,521,000
Tulsa/West Tulsa Levee	5,025,000	266,397,000
Wister	19,698,000	111,372,000
Total Arkansas River Basin	$213,979,000	$2,443,391,000

RED RIVER BASIN	FY 1990	CUMULATIVE THRU FY 1990
Altus	-	5,874,000
Arbuckle	284,000	746,000
Broken Bow	1,158,000	17,958,000
Denison	33,292,000	100,271,000
Fort Cobb	45,000	961,000
Foss	66,000	4,155,000
Hugo	7,086,000	16,085,000
Lake Kemp	69,000	4,171,000
Mountain Park	231,000	984,000
Pat Mayse	740,000	5,847,000
Pine Creek	2,549,000	20,158,000
Sardis	3,710,000	11,931,000
Waurika	2,777,000	27,602,000
Total Red River Basin	52,007,000	216,743,000
GRAND TOTAL	$265,986,000	$2,660,134,000

8. ANNUAL FLOOD DAMAGES, BY STATE, PREVENTED BY CORPS PROJECTS

a. ALBUQUERQUE DISTRICT.

State	FY 90 Damages Prevented In Thousands of Dollars
Colorado	0
New Mexico	42,531
Kansas	0

b. FORT WORTH DISTRICT. Flood damages prevented by Fort Worth District projects during Fy 1990 in the state of Texas were $4,073,091,000.

c. GALVESTON DISTRICT. Annual flood damages prevented by Corps projects during FY90 in the state of Texas were $32,012,000.

d. Little Rock District. The annual flood damages prevented in each state served by the Little Rock District during FY 90 is shown in the following table:

State	FY 90 Damages Prevented
Arkansas	$174,527,000
Missouri	11,368,000

e. TULSA DISTRICT. Annual flood damages prevented by Corps projects in FY 1990 for the state of Kansas amounted to $10,935,000; for Oklahoma, $220,136,000; for Arkansas, $17,460,000; and for Texas, $17,455,000.

9. ANNUAL FLOOD DAMAGES, BY STATE, PREVENTED BY CORPS SUPPORTED EMERGENCY OPERATIONS.

a. ALBUQUERQUE DISTRICT. None

b. FORT WORTH DISTRICT. None

c. GALVESTON DISTRICT. None

d. LITTLE ROCK DISTRICT. The flood damages prevented in FY90 by Emergency Operations occurred primarily during the months of May and June. Heavy rains had occurred all through March and April thus creating saturated soil conditions in Arkansas and Oklahoma. An approximate 50 year flood event occurred on the Arkansas River while record flood stages occurred on the Red River in southwestern Arkansas. Levee patrolling, sandbagging operations and emergency closure of leaking gates caused significant saving of lives and property damage along the Arkansas River. Emergency closures and sandbagging operations on abandoned levees along the Red River allowed evacuation of mobile homes from a trailer park and vehicular traffic along Highway 71 before the levee overtopped. Sandbagging also occurred at upper lake levels and downstream of dams as a result of heavy rains and surcharge releases. A total of $212,089.03 was spent on these emergency operations. A conservative description of damages prevented are as follows:

Location	Description	Damages Prevented
Arkansas River	Navigation Warnings	$500,000
	Barge & Yacht Rescues	180,000
	Sandbagging Ops in Ft Smith Area	500,000
	Emer Levee Protection near Ozark	200,000
	Sandbagging Morrilton-Conway Area	250,000
	Sandbagging Little Rock-NLR Area	600,000
	Levee Patrolling and Emer Gate Closure	900,000
Petit Jean River	Save HWY 309 Bridge	200,000
	Sandbagging DS of Dam	50,000
Fourche La Fave	Sandbagging US & DS of Dam	250,000
Red River	Closure of Levee Openings	180,000
	Sandbagging US HWY 71	200,000
White River	Levee Patrols & Gate Closures	150,000
	TOTAL	$4,160,000

e. TULSA DISTRICT. Not available.

10. HYDROPOWER PRODUCTION.

a. ALBUQUERQUE DISTRICT. The county of Los Alamos, New Mexico has finished construction of the 12.6 megawatt generating plant at Abiquiu Dam. The plant began generating power in Mar 1990 and total production for the year was 13,414 megawatt hours.

b. FORT WORTH DISTRICT. Hydropower production by project for Fiscal Years 1986 through 1990 is shown in the following table.

Project	Gross Generation (MWH)	Fiscal Year
Canyon	21,391	1990
	8,156	1989
Sam Rayburn	159,268	1990
	53,841	1989
	110,577	1988
	147,319	1987
	106,726	1986
Town Bluff (R. D. Willis)	33,821	1990
	81	1989
Whitney	85,936	1990
	111,241	1989
	18,152	1988
	110,216	1987
	51,900	1986

c. GALVESTON DISTRICT. N/A

d. LITTLE ROCK DISTRICT. The annual hydropower production at LRD plants in total GWH by fiscal year is shown in the following table:

Project	1986	1987	1988	1989	1990
Beaver	215.8	156.6	192.4	159.9	235.4
Table Rock	648.2	434.7	636.3	706.3	197.3
Bull Shoals	880.5	572.2	897.2	703.8	567.5
Norfork	215.9	127.8	223.9	216.6	237.1
Greers Ferry	150.6	106.9	201.8	240.5	248.6
Ozark	490.6	343.9	334.6	407.8	291.5
Dardanelle	802.8	833.3	601.8	479.1	796.6
Totals(GWH)	3,404.4	2,575.4	3,088.0	2,914.0	3,574.0

e. TULSA DISTRICT. Hydropower generation at Tulsa District projects for FY 1986 through 1990 is shown in the following table.

HYDROPOWER PRODUCTION
FOR TULSA DISTRICT PROJECTS

NET ANNUAL GENERATION (GWH)

	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
Denison	295	533	193	310	331
Broken Bow	147	88	107	175	223
SUB-TOTAL	442	621	300	485	554
Keystone	333	501	180	255	293
Fort Gibson	295	288	138	212	210
Webbers Falls	351	287	103	264	251
Tenkiller Ferry	172	148	75	121	145
Eufaula	336	461	198	304	370
Robert S. Kerr	726	773	371	548	561
SUB-TOTAL	2,213	2,458	1,065	1,704	1,830
TOTAL	2,655	3,079	1,365	2,189	2,384

11. LAKE ATTENDANCE.

a. ALBUQUERQUE DISTRICT. The following is a listing of attendance at Corps and Section 7 projects in the Albuquerque District.

Project Attendance in Thousands
Year

Project	1986	1987	1988	1989	1990
Abiquiu	571.4	406.5	512.3	547.1	423
Cochiti	978.1	819.7	867.2	905.6	856
Conchas	586.7	408.8	625.0	581.2	442
Galisteo	8.3	5.8	5.9	5.1	3.0
Jemez Canyon	53.5	53.3	58.9	55.6	49
John Martin	702.9	1,012.7	754.3	467.4	390
Santa Rosa	233.3	191.6	156.1	126.1	106
Trinidad	274.3	282.1	395.9	299.0	279
Two Rivers	17.6	13.2	11.3	12.0	12
Pueblo	1,509.1	1,476.5	1,365.1	1460.4	1176.1
Platoro	13.2	8.4	8.8	8.8	8
Sumner	138.3	95.5	106.2	111.1	64.0
Navajo	527.6	417.0	479.0	416.5	503.2
Brantley				4.0	75

b. FORT WORTH DISTRICT. Lake attendance for both the Fort Worth District Corps' lakes and the Section 7 lakes is presented in the following table. The attendance is presented for the period FY 1986 through FY 1990. Figures for FY 1986 through FY 1989 are for number of visitors regardless of the number of hours each was at the lakes. FY 1990 figures are for the estimated total hours that were spent at each lake.

PROJECT ATTENDANCE IN THOUSANDS

LAKE PROJECT	1986	1987	1988	1989	1990
Aquilla	104	105	106	110	312
Bardwell	770	780	801	263	1,415
Belton	2,504	2,600	2,701	2,227	10,551
Benbrook	2,585	2,700	2,570	1,201	3,583
Canyon	2,429	2,000	2,170	1,120	6,987
Georgetown	970	800	950	424	4,889
Granger	325	340	350	204	923
Grapevine	4,078	4,200	4,450	1,552	4,004
Hords Creek	437	450	600	150	1,151
Joe Pool	-	2	3	18	3,939
Lake O' the Pines	2,435	2,400	2,750	1,256	8,690
Lavon	3,653	3,700	3,950	1,400	5,984
Lewisville	7,205	7,300	6,990	2,235	7,673
Navarro Mills	1,320	1,400	1,450	840	5,392
O. C. Fisher	535	550	610	420	2,045
Proctor	930	940	965	1,345	2,941
Ray Roberts	-	1	2	3	3,888
Sam Rayburn	3,320	3,400	3,550	2,740	18,309
Somerville	1,380	1,400	1,460	2,110	18,539
Stillhouse Hollow	1,205	1,300	1,250	555	3,459
Town Bluff	590	600	625	800	4,731
Waco	4,891	4,900	4,875	1,975	6,527
Whitney	2,350	3,400	2,750	1,890	6,779
Wright Patman	3,072	3,100	2,990	4,442	15,154
Marshall Ford		NOT AVAILABLE			
Twin Buttes		NOT AVAILABLE			

c. GALVESTON DISTRICT. N/A

d. LITTLE ROCK DISTRICT. Annual lake attendance at all LRD projects is shown in the following table:

CY 1986 - 44,128,000 Visitor days
CY 1987 - 47,000,000 Visitor days
CY 1988 - 189,763,000 Visitor hours
FY 1989 - 174,692,000 Visitor hours
FY 1990 - 175,000,000 (est) Visitor hours

e. TULSA DISTRICT. Lake attendance figures for calendar years 1985 through September 1990 are tabulated in the table on page VI-49. Official visitation figures have recently been converted to a visitor hour basis (estimated number of hours spent by all visitors to the project). The 1985 figures are shown in recreation days (estimated number of persons visiting the project for any length of time). The 1986 figures are shown in both visitor hours and recreation days of use, and 1987, 1988, 1989, and 1990 figures are shown in visitor hours only.

12. WATER SUPPLY STORAGE.

a. ALBUQUERQUE DISTRICT. Cochiti, Galisteo, Jemez Canyon and Two Rivers projects do not have storage allocated for water supply. The following table is a listing of reservoirs with space allocated.

Storage in Thousands of Acre-Feet

Project	Storage Allocated	Amount Contracted	Number of Contracts	Water Supplied FY 89	Water Supplied FY 90
Conchas	254	0	0	47.1	52.3
John Martin	345	0	0	89.5	73.9
Santa Rosa	200	0	0	78.5	44.7
Trinidad	20	0	0	22.9	13.0
Abiquiu	200	170.9	1	0	19.5

b. FORT WORTH DISTRICT. Water supply information by project is shown in the following table.

Project Name	Amount of Storage Allocated (AC-FT)	Amount of Storage Contracted (AC-FT)	Number Contracts (Users)	Amount Supplied (AC-FT) FY 89	FY90
Aquilla	52,480	36,600	1	2,000	965
Bardwell	42,800	21,400	1	3,900	2,400
Belton	372,700	372,700	2	49,200	41,200
Benbrook	23,708 2/	23,708 2/	1	4,900	6,850
Canyon	366,400	366,400	1	163,300	183,000
Georgetown	29,200	4,864	1	6,600	4,600
Granger	37,900	0	1	0	0
Grapevine	161,250	161,250	3	30,600	19,000
Hords Creek	5,780	5,780	1	250	165
Joe Pool	142,900	142,900	1	790	75
Lake o' the Pines	250,000	250,000	1	12,500	16,700
Lavon	220,000 3/	220,000 3/	1	151,800	152,000
Lewisville	436,000	436,000	2	138,500	101,200
Navarro Mills	53,200	53,200	1	6,800	5,600
O. C. Fisher	80,400	80,400	1	7,200	0
Proctor	31,400	31,400	1	8,700	11,400
Ray Roberts	799,746	415,868	2	0	0
Sam Rayburn	43,000 1/	43,000	2	0	0
Somerville	143,900	143,900	1	2,300	2,200
Stillhouse	204,900	204,900	1	5,800	0
Town Bluff	1/	1/	1	1,889,600	2,060,000
Waco	104,100	104,100	2	74,000	25,100
Whitney	50,000	50,000	1	20,200	11,400
Wright Patman	91,263	91,263	1	32,900	47,700

1/ LVNA is permitted to withdraw from Town Bluff project not to exceed 2,000 cfs. This lake acts as a re-regulation dam to Sam Rayburn.

2/ Remaining 48,702 ac-ft of navigation storage is in the process of being negotiated with water user.

3/ NTMWD has given assurances for an additional 160,000 ac-ft of storage in Lavon.

c. GALVESTON DISTRICT. N/A

d. LITTLE ROCK DISTRICT. Water supply allocations, contracts and usages for FY89 and FY90 are shown by project in the following table:

Project	Amount of storage allocated (ac-ft)	Amount of storage contracted (ac-ft)	Number of contracts	Amount supplied (ac-ft) FY89	FY90 (est)
Beaver	117,000	40,000	2	34,358	36,739
Norfork	2,400	2,400	1	2,586	2,824
Greers Ferry	3,215	1,125	* 2	1,519	1,858
Nimrod	33	33	1	67	66
DeQueen	24,644	0	0	0	0
Gillham	20,600	123	1	762	814
Dierks	10,100	190	1	266	232
Millwood	150,000	32,828	1	55,112	52,838

* City of Heber Springs is authorized to use Greers Ferry Lake for water supply without charge (storage = 2,090 ac-ft).

e. TULSA DISTRICT. Storage allocated to water supply totals 3,840,240 acre-feet in the Tulsa District. The Corps has 2,115,220 acre-feet in 30 projects while the Section 7 projects totaled 1,725,020 acre-feet in 11 projects. Pages VI-50 thru VI-52 are a project listing showing water supply storage, yield, amount contracted, number of contracts (existing and pending), and usage.

TULSA DISTRICT
ATTENDANCE AT CORPS OF ENGINEERS
PROJECTS (THOUSANDS)

PROJECT	1985 rec.days	1986 rec.days	CY 1986	CY 1987	CY 1988	CY 1989	CY 1990*
Great Salt Plains	328.2	432.9	6059.2	7204.0	4582.0	4106.0	1972.9
Fort Supply	860.5	729.5	4295.4	8903.0	7410.0	3902.0	4250.0
Canton	2625.0	2706.1	24764.0	33595.0	16944.0	15330.0	14662.2
Hulah	357.7	337.8	1634.3	3818.0	1293.0	769.0	275.0
Tenkiller	2182.0	2379.1	42435.4	49419.0	49192.0	19008.0	21362.2
Wister	838.2	771.6	7752.6	10785.0	8786.0	11186.0	7619.9
Keystone	3262.6	3240.9	6399.9	14634.0	12734.0	9926.0	9292.0
Oologah	2837.1	2300.0	23031.6	21436.0	19546.0	10066.0	11152.3
Fort Gibson	4933.9	4493.7	62783.8	77190.0	51397.0	32249.0	26774.4
Fall River	192.5	228.3	2797.1	2241.0	2227.0	1265.0	1276.8
Toronto	161.9	197.2	4357.0	3511.0	3216.0	2255.0	2649.3
Elk City	281.2	280.2	7886.3	3508.0	2535.0	1583.0	1580.9
Optima	141.1	131.4	421.2	346.0	211.0	200.0	175.8
Pat Mayse	386.8	456.9	3753.9	3768.0	2443.0	1684.0	1839.0
Eufaula	4607.3	4154.5	57851.1	70942.0	36180.0	35792.0	3110.3
Heyburn	280.2	269.8	1847.4	1893.0	1465.0	857.0	1057.0
Hugo	917.2	846.4	4472.0	5746.0	2117.0	2100.0	1979.6
Texoma	8683.5	8479.1	141609.5	179969.0	112274.0	86292.0	79233.5
Waurika	829.6	8[illegible]3.3	4495.3	5163.0	7197.0	5098.0	1907.1
John Redmond	242.0	296.2	1654.4	1915.0	1418.0	905.0	1064.1
Council Grove	473.9	473.2	7801.4	8769.0	10385.0	5516.0	1137.0
Broken Bow	949.2	906.3	25638.7	26556.0	15693.0	15263.0	9262.6
Marion	325.1	317.0	5280.9	5793.0	4601.0	3599.0	3129.3
Pine Creek	849.7	983.7	11949.7	7285.0	2959.0	5121.0	7279.8
Robert S. Kerr	1031.6	1128.2	5807.4	6382.0	3230.0	3732.0	3542.4
W.D. Mayo L&D	197.1	224.0	890.6	975.0	451.0	379.0	218.7
Chouteau L&D	373.3	348.4	3160.4	3915.0	2964.0	1462.0	1332.2
Newt Graham L&D	338.8	239.1	2347.6	2423.0	1432.0	1306.0	1572.2
Webbers Falls	1111.4	917.1	13530.2	12502.0	6062.0	5700.0	4643.6
Birch	214.6	246.6	1535.1	1414.0	1261.0	540.0	509.8
Kaw	1139.0	1317.9	586.4	5599.0	13048.0	7151.0	6872.9
Big Hill	472.4	396.2	2047.2	2096.0	4346.0	4533.0	1639.3
Sardis	316.1	310.3	2215.3	1586.0	6373.0	4195.0	3101.0
El Dorado	525.3	772.6	958.2	7678.0	4630.0	4348.0	5222.2
Copan	209.4	213.8	1051.4	1873.0	228.0	480.0	592.6
Skiatook		408.8	4321.7	4097.0	2845.0	5047.0	5809.2
Arcadia					1650.0	2472.0	3884.0
DISTRICT TOTAL	43503.3	42390.0	509923.6	604829.0	425335.0	314998.0	281,327.1

* Total for January through September 1990.

WATER SUPPLY STORAGE

Corps of Engineers Projects
(October 1990)

PROJECT	STORAGE ALLOCATED TO WATER SUPPLY AF	ESTIMATED YIELD MGD	AMOUNT CONTRACTED AF	NUMBER OF EXISTING	CONTRACTS PENDING	AMOUNT SUPPLIED AF FY 89	AMOUNT SUPPLIED AF FY 90
ARKANSAS RIVER BASIN							
Arcadia	23090	11	23090	1	0	2361	2564
Pearson-Skubitz Big Hill	25700	8.5	25700	1	0	559	576
Birch	7630	3	0	0	0	0	0
Canton	38000 (1)	10	0	0	0	0	0
Copan	7500	3	5000	1	0	84	82
Council Grove	24400	6	24400	1	0	0	0
El Dorado	142800	22.2	142800	1	0	8377	8227
Elk City	24300	10	24300	1	0	0	0
Eufaula	56000	50	12384	19	1	1539	2359
Fort Gibson	0	0	0	0	0	15124	16832
Fort Supply	400	0.2	400	1	0	171	192
Heyburn	2000 (2)	1.7	2000	3	0	1626	1811
Hulah	19800	12.4	19800	4	0	11230	7845
John Redmond	34900	24.5	34900	1	0	8910	784
Kaw	171200	167	90800	3 (3)	0	5862	6250
Keystone	20000	20	18000	1	0	4788	10635
Marion	38300	3	38300	1	0	774	820
Oologah	342600	154	327005	8	1	51838	61295

WATER SUPPLY STORAGE

Corps of Engineers Projects
(October 1990)

PROJECT	STORAGE ALLOCATED TO WATER SUPPLY AF	ESTIMATED YIELD MGD	AMOUNT CONTRACTED AF	NUMBER OF EXISTING	CONTRACTS PENDING	AMOUNT SUPPLIED AF FY 89	AMOUNT SUPPLIED AF FY 90
Optima	76200	0 (4)	0	0	0	0	0
Skiatook	62900	14	17308	6 (3)	0	0	0
Tenkiller	25400	25.63 (4)	17817	13	0	5445	5937
Toronto	400	0.1	400	2	0	85	83
Wister	14000	20.03	13653	3	0	2423	3492
RED RIVER BASIN							
Broken Bow	152500	175	8355	2	0	0	0
Hugo	47600	58	44890	3	0	7850	7202
Pat Mayse	109600	55	109600	1	0	12357	11447
Pine Creek	49400	84	28800	1	0	33639	33915
Sardis	297200	140	297200	1	0	0	0
Texoma (5)	150000	150	114956	5	0	108	343
Waurika	151400	36.2	41800	1	0	2089	1139

WATER SUPPLY STORAGE

Section 7 Projects
(October 1990)

PROJECT (6)	STORAGE ALLOCATED TO WATER SUPPLY AF	AMOUNT SUPPLIED AF FY 89	AMOUNT SUPPLIED AF FY 90
ARKANSAS RIVER BASIN			
Cheney	146980	25206	30001
Hudson	0	0	0
Meredith	499700	68448	72299
Thunderbird	105900	15252	18867
RED RIVER BASIN			
Altus	122900	55621	53256
Arbuckle	62570	11337	8015
Fort Cobb	78350	11179	9317
Foss	243670	1790	1975
Lake Kemp	268000	47527	32144
Mountain Park	88950	4493	2607
McGee Creek	108000	58	21

(1) Based on 1977 sedimentation survey.
(2) Estimated storage to be available in year 2000.
(3) Total includes one contract for conduit only.
(4) Revision due to water supply yield restudy.
(5) Joint water supply and power provided between elevation 617.0 - 590.0.
(6) Estimated yield and contract information not available.

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR 1990

ALBUQUERQUE DISTRICT

	GENERAL INVESTIGATIONS		CONSTRUCTION GENERAL					CORPS	
	STUDIES	GEN. COV	PLAN AE&D	PROJ. CONST	O&M	MR&T	CORPS TOTAL	PER-CENT	PROGRAM SUPPORT
FUNDS (DOLLARS)									
GAGE CLASS - SW	0	0	0	0	179,325	0	179,325	93	193,435
- QW	0	0	0	0	0	0	0	0	0
- SS	0	0	0	0	0	0	0	0	0
- OT	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	179,325	0	179,325	93	193,435
PERCENT	0.0	0.0	0.0	0.0	100.0	0.0	100.0		
NUMBER OF EQUIVALENT GAGES FUNDED									
GAGE CLASS - SW	0.0	0.0	0.0	0.0	36.9	0.0	36.9	94	39.0
- QW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
- SS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
- OT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
TOTAL	0.0	0.0	0.0	0.0	36.9	0.0	36.9	94	39.0

NUMBER OF GAGING STATIONS/SITES: 39

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 39
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR 1990

FORT WORTH DISTRICT

	GENERAL INVESTIGATIONS		CONSTRUCTION GENERAL					CORPS	
	STUDIES	GEN. COV	PLAN AE&D	PROJ. CONST	O&M	MR&T	CORPS TOTAL	PER-CENT	PROGRAM SUPPORT
FUNDS (DOLLARS)									
GAGE CLASS - SW	0	0	0	17,950	467,900	0	485,850	94	514,950
- QW	0	0	0	18,540	245,970	0	264,510	95	277,710
- SS	0	0	0	0	0	0	0	0	0
- OT	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	36,490	713,870	0	750,360	95	792,660
PERCENT	0.0	0.0	0.0	4.9	95.1	0.0	100.0		
NUMBER OF EQUIVALENT GAGES FUNDED									
GAGE CLASS - SW	0.0	0.0	0.0	5.0	87.3	0.0	92.3	87	106.0
- QW	0.0	0.0	0.0	2.8	28.3	0.0	31.1	94	33.0
- SS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
- OT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
TOTAL	0.0	0.0	0.0	7.8	115.6	0.0	123.4	89	139.0

NUMBER OF GAGING STATIONS/SITES: 114

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 12
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR [illegible]

GALVESTON DISTRICT

	GENERAL INVESTIGATIONS		CONSTRUCTION GENERAL					CORPS	
	STUDIES	GEN. COV	PLAN AE&D	PROJ. CONST	O&M	MR&T	CORPS TOTAL	PER-CENT	PROGRAM SUPPORT
FUNDS (DOLLARS)									
GAGE CLASS - SW	5,910	0	0	23,860	630,150	0	659,920	92	716,260
- QW	0	0	0	18,540	245,970	0	264,510	95	277,710
- SS	0	0	0	0	0	0	0	0	0
- OT	0	0	0	0	0	0	0	0	0
TOTAL	5,910	0	0	42,400	876,120	0	924,430	93	993,970
PERCENT	0.6	0.0	0.0	4.6	94.8	0.0	100.0		
NUMBER OF EQUIVALENT GAGES FUNDED									
GAGE CLASS - SW	1.0	0.0	0.0	6.0	114.0	0.0	120.9	87	139.0
- QW	0.0	0.0	0.0	2.8	28.3	0.0	31.1	94	33.0
- SS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
- OT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
TOTAL	1.0	0.0	0.0	8.8	142.3	0.0	152.1	88	172.0

NUMBER OF GAGING STATIONS/SITES: 33

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 17
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR 1979

LITTLE ROCK DISTRICT

	GENERAL INVESTIGATIONS		CONSTRUCTION GENERAL					CORPS	
	STUDIES	GEN. COV	PLAN AE&D	PROJ. CONST	O&M	MR&T	CORPS TOTAL	PER-CENT	PROGRAM SUPPORT
FUNDS (DOLLARS)									
GAGE CLASS - SW	11,810	7,830	0	23,860	1,008,950	0	1,052,450	86	1,224,185
- QW	0	0	0	18,540	264,020	0	282,560	95	297,160
- SS	0	0	0	0	5,500	0	5,500	47	11,780
- OT	0	0	0	0	0	0	0	0	0
TOTAL	11,810	7,830	0	42,400	1,278,470	0	1,340,510	87	1,533,125
PERCENT	0.9	0.6	0.0	3.2	95.4	0.0	100.0		
NUMBER OF EQUIVALENT GAGES FUNDED									
GAGE CLASS - SW	3.0	3.6	0.0	6.0	164.1	0.0	176.7	84	210.0
- QW	0.0	0.0	0.0	2.8	30.2	0.0	33.0	94	35.0
- SS	0.0	0.0	0.0	0.0	2.7	0.0	2.7	55	5.0
- OT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
TOTAL	3.0	3.6	0.0	8.8	197.1	0.0	212.5	85	250.0

NUMBER OF GAGING STATIONS/SITES: 73

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 12
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND

STATION SUMMARY
COOPERATIVE STREAM GAGING PROGRAM
FISCAL YEAR 1990

TULSA DISTRICT

	GENERAL INVESTIGATIONS		CONSTRUCTION GENERAL					CORPS	
	STUDIES	GEN. COV	PLAN AE&D	PROJ. CONST	O&M	MR&T	CORPS TOTAL	PER-CENT	PROGRAM SUPPORT
FUNDS (DOLLARS)									
GAGE CLASS - SW	11,810	7,830	0	23,860	1,957,519	0	2,001,019	77	2,605,224
- QW	0	0	0	18,540	311,700	0	330,240	96	345,225
- SS	0	0	0	0	21,405	0	21,405	53	40,585
- OT	0	0	0	0	27,010	0	27,010	100	27,010
TOTAL	11,810	7,830	0	42,400	2,317,634	0	2,379,674	79	3,018,044
PERCENT	0.5	0.3	0.0	1.8	97.4	0.0	100.0		
NUMBER OF EQUIVALENT GAGES FUNDED									
GAGE CLASS - SW	3.0	3.6	0.0	6.0	305.0	0.0	317.6	78	405.0
- QW	0.0	0.0	0.0	2.8	37.1	0.0	39.9	95	42.0
- SS	0.0	0.0	0.0	0.0	42.2	0.0	42.2	90	47.0
- OT	0.0	0.0	0.0	0.0	17.0	0.0	17.0	100	17.0
TOTAL	3.0	3.6	0.0	8.8	401.3	0.0	416.7	82	511.0

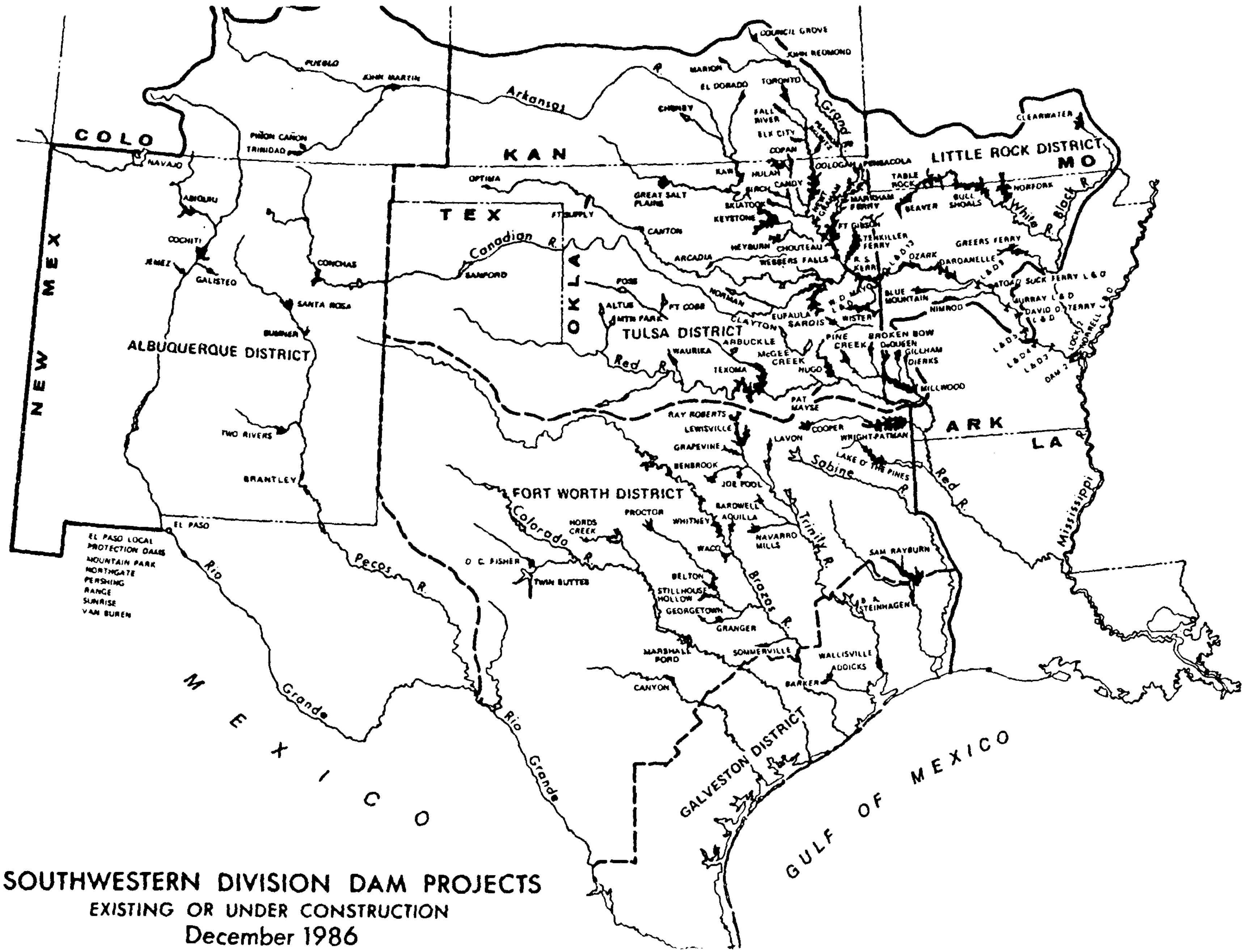
NUMBER OF GAGING STATIONS/SITES: 217

NUMBER OF GAGES FUNDED 100% BY COOP PROGRAM: 79
NOTE: INCLUDES AER FUNDS

0 DUPLICATE GAGE NUMBERS WERE FOUND

SECTION VII - RESERVOIR DATA SUMMARY

1. SWD MAP
2. INDEX BY BASINS
3. INDEX IN ALPHABETICAL ORDER
4. DATA TABLES



SOUTHWESTERN DIVISION DAM PROJECTS
EXISTING OR UNDER CONSTRUCTION
December 1986

RESERVOIR SUMMARY TABLE INDEX

LAKE NAME	STREAM	DIST	STATE	YR COMP	POOL ELEVATION CONS	POOL ELEVATION FC	CAPACITY** 1000 AF CONS	CAPACITY** 1000 AF FC	PAGE NO
			WHITE RIVER BASIN						
BEAVER	WHITE	LRD	AR	66	1120.00	1130.00	1652	300	1
TABLE ROCK	WHITE	LRD	AR/MO	58	915.00	931.00	2702	760	1
BULL SHOALS	WHITE	LRD	AR/MO	52	654.00	695.00	3048	2360	2
NORFORK	NORTH FORK	LRD	AR/MO	45	552.00	580.00	1251	732	2
CLEARWATER	BLACK	LRD	MO	48	494.00	567.00	22	391	3
GREERS FERRY	LITTLE RED	LRD	AR	62	461.00	487.00	1119	934	3
			ARKANSAS RIVER BASIN						
PUEBLO	ARKANSAS	AD*	CO	74	4880.60	4898.70	264	93	4
TRINIDAD	PURGATORIE R	AD	CO	78	6226.40	6260.00	64	58	4
JOHN MARTIN	ARKANSAS	AD	CO	51	3851.00	3870.00	351	270	5
CHENEY	N F NINNESCAH	TD*	KS	64	1421.60	1429.00	167	81	5
ELDORADO	WALNUT	TD	KS	80	1339.00	1347.50	157	79	6
KAW	ARKANSAS	TD	OK/KS	76	1010.00	1044.50	429	919	6
GREAT SALT PLAINS	SALT FORK ARK	TD	OK	41	1125.00	1138.50	31	240	7
KEYSTONE	ARKANSAS	TD	OK	64	723.00	754.00	613	1219	7
HEYBURN	POLECAT CR	TD	OK	50	761.50	784.00	7	48	8
TORONTO	VERDIGRIS R	TD	KS	60	901.50	931.00	22	178	8
FALL RIVER	FALL	TD	KS	49	948.50	987.50	24	235	9
ELK CITY	ELK	TD	KS	66	792.00	825.00	34	256	9
BIG HILL	BIG HILL CR	TD	KS	81	858.00	867.50	27	13	10
OOLOGAH	VERDIGRIS R	TD	OK	63	638.00	661.00	553	966	10
HULAH	CANEY	TD	OK/KS	51	733.00	765.00	36	258	11
COPAN	L CANEY	TD	OK/KS	80	710.00	732.00	43	184	11
BIRCH	BRICH CREEK	TD	OK	79	750.50	774.00	19	39	12
SKIATOOK	HOMINY CREEK	TD	OK	82	714.00	729.00	305	182	12
NEWT GRAHAM LD 18	VERDIGRIS	TD	OK	70	532.00	.00	24	0	13
CHOUTEAU LD 17	VERDIGRIS	TD	OK	70	511.00	.00	23	0	13
COUNCIL GROVE	NEOSHO R	TD	KS	65	1270.00	1289.00	38	76	14
MARION	COTTONWOOD R	TD	KS	68	1350.50	1358.50	86	60	14
JOHN REDMOND	NEOSHO R	TD	KS	64	1039.00	1068.00	82	563	15
PENSACOLA (GRAND LAKE)	NEOSHO (GRAND)	TD*	OK	40	745.00	755.00	1672	525	15
LAKE HUDSON	NEOSHO (GRAND)	TD*	OK	64	619.00	636.00	200	244	16
FORT GIBSON	NEOSHO (GRAND)	TD	OK	52	544.00	582.00	365	919	16
WEBBERS FALLS LD 16	ARKANSAS	TD	OK	70	490.00	.00	165	0	17
TENKILLER FERRY	ILLINOIS R	TD	OK	52	632.00	667.00	654	577	17
CONCHAS	CANADIAN R	AD	NM	39	4201.00	4218.00	330	198	18
SANFORD (MEREDITH)	CANADIAN R	TD*	TX	65	2941.30	2965.00	945	463	18
NORMAN (THUNDERBIRD)	LITTLE R	TD*	TX	65	1039.00	1049.40	120	77	19
OPTIMA	N CANADIAN R	TD	OK	78	2763.50	2779.00	129	101	19
FORT SUPPLY	WOLF CR	TD	OK	42	2004.00	2028.00	14	87	20
CANTON	N CANADIAN R	TD	OK	48	1615.20	1638.00	116	268	20
ARCADIA	ARKANSAS	TD	OK	86	1006.00	1029.50	28	65	21
EUFAULA	CANADIAN R	TD	OK	64	585.00	597.00	2329	1470	21
R S KERR LD 15	ARKANSAS	TD	OK	70	460.00	.00	494	0	22

LAKE NAME	STREAM	DIST	STATE	YR COMP	POOL ELEVATION CONS	POOL ELEVATION FC	CAPACITY** 1000 AF CONS	CAPACITY** 1000 AF FC	PAGE NO
W D MAYO LD 14	ARKANSAS	TD	OK	70	413.00	.00	16	0	22
WISTER	POTEAU R	TD	OK	49	471.60	502.50	27	400	23
JAMES W TRIMBLE LD 13	ARKANSAS	LRD	AR/OK	69	392.00	.00	54	0	23
OZARK-J T LD 12	ARKANSAS	LRD	AR	69	372.00	.00	148	0	24
DARDANELLE LD 10	ARKANSAS	LRD	AR	64	338.00	.00	486	0	24
BLUE MOUNTAIN	PETIT JEAN	LRD	AR	47	384.00	419.00	25	233	25
ARTHUR V ORMOND LD 9	ARKANSAS	LRD	AR	69	287.00	.00	65	0	25
TOAD SUCK FERRY LD 8	ARKANSAS	LRD	AR	69	265.00	.00	35	0	26
NIMROD	FOURCHE LA FAVE	LRD	AR	42	342.00	373.00	29	307	26
MURRAY LD 7	ARKANSAS	LRD	AR	69	249.00	.00	87	0	27
DD TERRY LD 6	ARKANSAS	LRD	AR	68	231.00	.00	50	0	27
LD 5	ARKANSAS	LRD	AR	68	213.00	.00	65	0	28
LD 4	ARKANSAS	LRD	AR	68	196.00	.00	70	0	28
LD 3	ARKANSAS	LRD	AR	68	182.00	.00	46	0	29
WILBUR D MILLS LD2	ARKANSAS	LRD	AR	67	162.00	.00	110	0	29
LD 1	ARKANSAS	LRD	AR	67	142.00	.00	2	0	29
				RED RIVER BASIN					
ALTUS	N F RED	TD*	OK	46	1559.00	1562.00	141	21	30
MOUNTAIN PARK (TOM STD.)	W OTTER CREEK	TD*	OK	75	1411.00	1414.00	96	20	30
LAKE KEMP	WICHITA R	TD*	TX	77	1144.00	1156.00	299	225	31
WAURIKA	BEAVER CREEK	TD	OK	78	951.40	962.50	203	140	31
FOSS	WASHITA	TD*	OK	61	1562.00	1668.60	256	181	32
FORT COBB	COBB CREEK	TD*	OK	59	1342.00	1354.80	78	64	32
ARBUCKLE	ROCK CREEK	TD*	OK	67	872.00	885.30	72	36	33
LAKE TEXOMA	RED	TD	TX/OK	45	617.30	640.00	2836	2660	33
McGEE CREEK	McGEE CREEK	TD*	OK	87	577.00	595.50	113	199	34
PAT MAYSE	SANDERS CREEK	TD	TX	68	451.00	460.50	124	65	34
SARDIS	JACK FORK CREEK	TD	OK	84	599.00	607.00	302	128	35
HUGO	KIAMICHI R	TD	OK	74	404.50	437.50	157	809	35
PINE CREEK	LITTLE R	TD	OK	69	443.50	480.00	78	388	36
BROKEN BOW	MOUNTAIN FORK	TD	OK	69	599.50	627.50	919	450	36
DEQUEEN	ROLLING FORK	LRD	AR	77	437.00	473.50	35	101	37
GILLHAM	COSSATOT	LRD	AR	76	502.00	569.00	33	189	37
DIERKS	SALINE R	LRD	AR	76	526.00	557.50	30	67	38
MILLWOOD	LITTLE R	LRD	AR	66	259.20	287.00	207	1653	38
WRIGHT PATMAN	SULPHER RIVR	FWD	TX	56	220.00	259.50	143	2509	39
LAKE O THE PINES	CYPRESS CREEK	FWD	TX	60	228.50	249.50	251	580	39
				NECHES RIVER BASIN					
SAM RAYBURN	ANGELINA R	FWD	TX	65	164.40	173.00	2898	1009	40
B A STEINHAGEN	NECHES R	FWD	TX	51	81.00	83.00	70	24	40
				TRINITY RIVER BASIN					
BENBROOK	CLEAR FORK	FWD	TX	52	694.00	724.00	88	170	41
JOE POOL	MOUNTAIN CREEK	FWD	TX	86	522.00	536.00	143	123	41
RAY ROBERTS	ELM FORK	FWD	TX	87	632.50	640.50	749	260	42
LEWISVILLE	ELM FORK	FWD	TX	54	515.00	532.00	465	525	42
GRAPEVINE	DENTON CR	FWD	TX	52	535.00	560.00	189	248	43

RESERVOIR SUMMARY TABLE INDEX

LAKE NAME	STREAM	DIST	STATE	YR COMP	POOL ELEVATION CONS	POOL ELEVATION FC	CAPACITY** 1000 AF CONS	CAPACITY** 1000 AF FC	PAGE NO
LAVON	EAST FORK	FWD	TX	77	492.00	503.50	457	277	43
NAVARRO MILLS	RICHLAND CR	FWD	TX	68	424.50	443.00	63	149	44
BARDWELL	WAXAHACHIE CR	FWD	TX	65	421.00	439.00	55	85	44
			SAN JACINTO RIVER BASIN						
BARKER	BUFFALO BAYOU	GD	TX	45	.00	107.00	0	207	45
ADDICKS	BUFFALO BAYOU	GD	TX	48	.00	114.00	0	205	45
			BRAZOS RIVER BASIN						
WHITNEY	BRAZOS	FWD	TX	51	533.00	571.00	627	1372	46
AQUILLA	AQUILLA	FWD	TX	83	537.50	556.00	34	87	46
WACO	BOSQUE	FWD	TX	65	455.00	500.00	153	574	47
PROCTOR	LEON R	FWD	TX	63	1162.00	1197.00	59	315	47
BELTON	LEON R	FWD	TX	54	594.00	631.00	458	640	48
STILLHOUSE H	LAMPASAS R	FWD	TX	68	622.00	666.00	236	395	48
GEORGETOWN	N F SAN GABRIEL	FWD	TX	79	791.00	834.00	37	93	49
GRANGER	SAN GRBRIEL	FWD	TX	79	504.00	524.00	66	179	49
SOMERVILLE	YEGUA CR	FW	TX	67	238.00	258.00	160	347	50
			COLORADO RIVER BASIN						
TWIN BUTTES	S&M CONCHO R	FWD*	TX	63	1940.20	1969.10	186	454	50
O C FISHER	N CONCHO R	FWD	TX	52	1908.00	1938.50	119	277	51
HORDS CR	HORDS CR	FWD	TX	48	1900.00	1920.00	9	17	51
MARSHALL FORD	COLORADO R	FWD*	TX	40	681.00	714.00	1172	790	52
			GUADALUPE RIVER BASIN						
CANYON	GUADALUPE R	FWD	TX	64	909.00	943.00	386	355	52
			RIO GRANDE BASIN						
PLATORO	CONEJOS R	AD*	CO	51	10027.50	10034.00	54	6	53
ABIQUIU	RIO CHAMA	AD	NM	63	.00	6283.50	0	568	53
BRANTLEY DAM	RIO GRANDE	AD	NM	88	3271.00	3283.00	1495	3485	54
COCHITI	RIO GRANDE	AD	NM	75	5321.45	5460.50	47	539	54
GALISTEO	GALISTEO CR	AD	NM	70	.00	5608.00	0	90	55
JEMEZ CANYON	JEMEZ R	AD	NM	53	5160.00	5232.00	2	104	55
SANTA ROSA	PECOS R	AD	NM	80	4776.50	4797.00	267	182	56
SUMNER	PECOS R	AD*	NM	37	4261.00	4282.00	47	86	56
TWO RIVERS	RIO HONDO	AD	NM	63	.00	4032.00	0	168	57
			SAN JUAN RIVER BASIN						
NAVAJO	SAN JUAN	AD*	NM	62	5990.00	6085.00	-	-	57

*Section 7 Flood Control Projects

**Includes dead storage, conservation, water supply, power, irrigation, etc.

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SUMMARY OF LAKE CONDITIONS FOR WATER YEAR 1990

WHITE RIVER BASIN

BEAVER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1968 THRU 1990	49.2	106.2	118.5	76.4	118.6	205.8	178.0	129.7	82.7	21.5	15.8	28.4	1130.7
WY 1990	3.2	2.9	3.0	74.7	235.9	382.5	372.3	505.0	90.2	7.2	9.0	18.5	1704.4
RELEASES (1,000 AC. FT.)													
AVG 1968 THRU 1990	34.1	50.3	86.6	83.9	102.3	112.7	135.3	117.1	86.7	81.7	81.6	53.6	1025.8
WY 1990	8.2	4.7	5.6	14.1	224.6	231.7	378.9	467.0	106.8	31.9	55.5	57.6	1586.6
BASIN RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.8	4.6	3.1	2.1	3.2	4.9	4.1	5.9	4.2	2.5	3.5	3.3	45.1
WY 1990	.5	.4	.5	6.1	6.7	8.6	9.0	13.6	4.6	1.8	2.0	5.7	59.4
DEVIATION	-3.4	-4.3	-2.6	4.0	3.5	3.7	4.9	7.7	.4	-.7	-1.5	2.4	14.3
POOL ELEVATION													
END OF MONTH	1118.61	1118.17	1117.84	1119.85	1120.05	1125.00	1124.44	1125.38	1124.20	1122.85	1120.85	1119.18	
MAXIMUM	1119.17	1118.61	1118.17	1120.02	1122.26	1126.43	1127.12	1129.18	1125.44	1124.20	1122.85	1120.85	
MINIMUM	1118.61	1118.17	1117.73	1117.79	1119.91	1119.78	1124.27	1124.38	1124.20	1122.85	1120.85	1119.17	
POOL CONTENT EOM													
(1,000 AC. FT.)	1613.1	1600.8	1591.7	1647.7	1653.3	1797.5	1780.8	1808.9	1773.6	1733.9	1676.2	1629.0	

TABLE ROCK LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1961 THRU 1990	104.8	218.0	283.2	213.0	287.7	432.6	433.3	387.9	233.0	133.4	109.7	96.4	2932.9
WY 1990	12.7	7.3	9.3	200.7	676.9	1004.4	815.5	1568.1	334.6	79.0	81.0	90.3	4879.7
RELEASES (1,000 AC. FT.)													
AVG 1961 THRU 1990	109.4	176.5	265.5	237.5	226.7	336.3	368.4	341.8	218.4	206.4	166.2	122.7	2775.7
WY 1990	163.5	90.5	27.6	12.4	377.7	857.4	805.1	1114.3	571.2	246.9	162.9	221.2	4640.5
BASIN RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.7	4.2	3.3	1.9	2.7	4.4	3.6	5.2	4.1	2.9	3.8	3.2	43.2
WY 1990	.6	.4	.5	5.4	6.0	7.7	4.3	12.3	3.8	1.7	1.7	5.3	49.7
DEVIATION	-3.1	-3.8	-2.8	3.5	3.3	3.2	.7	7.1	-.3	-1.2	-2.1	2.0	6.5
POOL ELEVATION													
END OF MONTH	907.01	904.86	904.18	908.82	915.77	918.75	918.69	927.41	921.54	917.30	914.99	911.56	
MAXIMUM	911.06	907.01	904.86	908.82	916.78	922.66	919.21	928.74	927.41	921.54	917.30	915.00	
MINIMUM	907.01	904.86	904.09	904.10	908.83	915.76	915.80	918.22	921.54	917.30	914.99	911.53	
POOL CONTENT EOM													
(1,000 AC. FT.)	2374.4	2291.7	2265.8	2445.8	2735.1	2866.7	2864.0	3278.5	2994.6	2802.2	2701.6	2557.0	

WHITE RIVER BASIN

BULL SHOALS LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1953 THRU 1990	148.9	270.8	242.9	301.6	356.2	557.2	576.4	579.1	348.4	258.4	199.9	158.2	3998.2
WY 1990	170.2	84.2	29.5	147.9	699.4	1339.7	1073.6	1735.0	677.3	273.6	175.3	254.0	6659.8
RELEASES (1,000 AC. FT.)													
AVG 1953 THRU 1990	234.5	195.4	276.3	343.1	324.5	398.6	446.8	391.9	315.5	398.7	355.0	251.6	3931.7
WY 1990	282.3	212.0	47.0	22.8	419.5	1002.9	859.0	360.7	594.5	838.3	978.8	712.4	6330.1
BASIN RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.5	4.2	3.2	1.9	2.9	4.2	3.3	5.0	3.9	2.9	3.3	3.0	41.3
WY 1990	.6	.6	.6	5.0	5.9	6.8	3.8	10.6	2.1	1.7	1.5	6.0	45.2
DEVIATION	-3.0	-3.6	-2.7	3.1	3.0	2.6	.5	5.5	-1.8	-1.1	-1.9	3.0	3.9
POOL ELEVATION													
END OF MONTH	649.93	646.58	645.85	648.50	654.50	661.00	665.06	688.06	688.21	678.71	663.66	653.67	
MAXIMUM	653.27	649.93	646.61	648.70	655.31	662.16	665.06	688.06	691.44	688.23	678.71	663.66	
MINIMUM	649.93	646.58	645.72	645.80	648.52	654.27	659.22	665.15	688.21	678.71	663.66	653.60	
POOL CONTENT EOM (1,000 AC. FT.)	2867.0	2724.4	2693.8	2805.5	3070.7	3378.5	3582.1	4931.0	4941.0	4341.6	3511.0	3033.1	

NORFORK LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1946 THRU 1990	51.6	96.0	122.7	119.3	134.4	188.8	197.8	193.7	106.7	75.0	48.2	46.3	1380.5
WY 1990	36.5	32.6	29.2	88.7	218.8	276.6	250.6	509.8	123.8	58.9	41.4	48.8	1715.5
RELEASES (1,000 AC. FT.)													
AVG 1946 THRU 1990	66.5	62.5	101.4	134.3	119.5	130.0	142.7	118.5	114.0	123.9	113.9	90.4	1317.5
WY 1990	10.5	22.8	26.8	82.2	202.5	182.4	148.2	89.7	156.9	242.3	240.3	187.4	1592.0
BASIN RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.6	4.5	3.7	2.1	3.0	4.2	3.4	5.0	3.6	3.0	2.8	2.9	41.8
WY 1990	1.2	.7	.7	4.7	6.5	5.8	4.2	9.1	1.8	1.6	1.5	4.3	41.9
DEVIATION	-2.3	-3.8	-3.0	2.6	3.4	1.6	.8	4.1	-1.8	-1.4	-1.3	1.4	.2
POOL ELEVATION													
END OF MONTH	551.73	551.90	551.73	551.78	552.25	555.52	560.04	575.44	573.45	566.20	557.73	551.26	
MAXIMUM	551.73	552.01	552.08	553.23	553.80	557.24	560.28	575.44	576.35	573.45	566.20	557.73	
MINIMUM	550.87	551.63	551.60	551.74	551.88	551.76	556.24	560.07	573.45	566.20	557.73	550.88	
POOL CONTENT EOM (1,000 AC. FT.)	1245.3	1249.0	1245.3	1246.4	1256.7	1330.2	1436.9	1846.5	1789.2	1591.7	1381.6	1234.9	

WHITE RIVER BASIN

CLEARWATER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1949 THRU 1990	22.5	50.3	44.7	59.9	60.1	89.4	93.3	76.7	40.4	26.2	20.3	20.2	604.1
WY 1990	16.7	13.9	13.9	233.7	108.8	66.7	104.0	191.1	84.0	22.3	19.0	14.0	888.1
RELEASES (1,000 AC. FT.)													
AVG 1949 THRU 1990	23.2	31.4	58.4	61.2	64.9	80.2	80.2	74.0	51.9	33.0	26.9	25.2	610.5
WY 1990	17.2	13.7	12.4	54.4	113.1	66.3	106.6	108.3	98.3	60.0	20.8	16.8	687.9
BASIN RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.7	5.4	3.9	2.1	2.8	4.2	4.0	4.6	3.6	3.9	3.9	3.0	45.0
WY 1990	1.7	1.1	.9	4.0	5.3	4.5	4.0	10.0	1.9	2.9	4.1	2.5	42.9
DEVIATION	-2.0	-4.3	-3.0	1.9	2.5	.3	-.0	5.4	-1.7	-1.0	.2	-.5	-2.1
POOL ELEVATION													
END OF MONTH	494.19	494.17	494.27	494.30	494.21	497.50	494.03	529.32	513.40	497.82	496.61	494.80	
MAXIMUM	495.20	494.28	494.27	505.90	506.60	497.78	500.59	529.40	529.34	513.40	497.82	496.68	
MINIMUM	493.96	493.96	493.98	494.02	494.21	493.92	494.03	494.02	513.40	497.16	496.28	494.80	
POOL CONTENT EOM													
(1,000 AC. FT.)	22.2	22.2	22.4	22.4	22.3	27.9	22.0	133.1	67.8	28.5	26.3	23.2	

GREERS FERRY LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1965 THRU 1990	42.9	113.5	181.3	116.5	164.0	235.2	210.2	154.9	54.7	11.2	8.1	24.4	1316.9
WY 1990	.2	.2	.3	117.9	311.0	339.7	253.9	456.5	52.0	.3	10.5	.2	1542.7
RELEASES (1,000 AC. FT.)													
AVG 1965 THRU 1990	34.8	39.1	76.1	139.8	143.3	145.3	146.3	126.1	92.3	105.0	89.5	51.3	1188.7
WY 1990	9.9	13.7	11.6	11.8	264.4	302.9	196.0	97.7	181.3	275.3	53.1	35.6	1453.4
BASIN RAINFALL (INCHES)													
AVG 1978 THRU 1990	4.1	5.6	4.4	2.8	4.1	5.0	4.3	6.0	3.3	2.8	3.1	3.6	49.2
WY 1990	.5	1.0	.8	6.6	7.1	8.0	5.0	10.3	2.8	2.0	4.6	4.4	53.0
DEVIATION	-3.6	-4.7	-3.6	3.8	3.0	3.0	.6	4.3	-.5	-.9	1.5	.8	3.7
POOL ELEVATION													
END OF MONTH	459.14	458.41	457.75	461.02	462.31	463.10	464.72	474.80	470.37	461.41	459.68	458.27	
MAXIMUM	459.77	459.14	458.41	461.03	464.04	465.30	464.72	474.90	475.15	470.37	461.42	459.77	
MINIMUM	459.14	458.41	457.65	457.71	461.30	461.30	462.00	464.76	470.37	461.41	459.68	459.77	
POOL CONTENT EOM													
(1,000 AC. FT.)	1852.3	1829.7	1809.5	1911.1	1951.9	1977.2	2029.4	2377.2	2219.9	1923.4	1869.1	1825.4	

ARKANSAS RIVER BASIN

PUEBLO RESERVOIR

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1894 thru 1990	22.06	22.50	21.36	19.96	16.83	16.49	24.23	68.00	127.64	86.92	55.78	25.78	507.55
FY 1990	17.08	23.75	22.17	20.01	17.95	19.39	18.29	40.9	119.02	68.96	43.44	16.20	427.21
Releases (1000 Ac-Ft)													
Avg 1966 thru 1990	20.37	16.08	13.65	13.97	13.69	15.80	27.87	64.66	123.13	90.11	57.04	25.03	481.42
FY 1990	18.94	13.04	6.83	7.18	15.43	17.77	23.37	47.44	125.28	84.48	51.42	30.60	441.78
Rainfall (Inches)													
Avg 1938 thru 1990	0.55	0.32	0.50	0.32	0.31	0.98	0.96	1.85	1.39	1.89	1.94	0.83	11.82
FY 1990	0.16	0.00	0.99	0.45	0.55	1.26	1.73	3.58	0.22	4.00	2.13	1.94	17.01
Pool Elevation (EOM)	4837.55	4841.28	4846.48	4850.57	4851.25	4851.48	4849.57	4846.98	4844.10	4838.14	4834.74	4828.60	
Maximum	4838.56	4841.28	4846.48	4850.57	4851.25	4851.31	4851.43	4849.52	4846.95	4843.98	4839.21	4834.55	
Minimum	4837.52	4837.51	4841.42	4846.64	4850.61	4851.07	4849.63	4846.84	4844.10	4838.14	4834.74	4828.25	
Pool Content (EOM) (1000 Ac-Ft)	110.77	121.05	136.10	148.65	150.81	151.55	145.52	137.59	129.10	112.37	103.28	87.89	

Data for compiling averages unavailable

TRINIDAD LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1896 thru 1990	2.36	1.69	1.50	1.29	1.23	1.60	4.23	10.78	12.99	10.05	8.35	3.68	56.62
FY 1990	1.61	1.13	0.96	0.94	0.84	1.09	1.64	4.27	5.62	8.53	4.52	2.64	33.80
Releases (1000 Ac-Ft)													
Avg 1978 thru 1990	1.48	0.48	0.21	0.17	0.19	0.22	2.06	9.71	12.72	11.66	9.79	8.15	56.84
FY 1990	0.20	0.51	0.00	0.00	0.00	0.43	1.45	6.08	8.08	5.82	7.75	1.91	32.23
Rainfall (Inches)													
Avg 1978 thru 1990	0.97	0.93	0.70	0.56	0.76	1.13	1.34	2.81	2.24	2.47	3.22	1.59	18.71
FY 1990	1.08	0.03	1.06	1.04	1.38	1.29	1.15	1.65	1.00	5.27	1.84	2.60	19.39
Pool Elevation (EOM)	6150.97	6152.37	6154.69	6156.90	6158.80	6160.07	6160.21	6155.46	6148.35	6154.89	6145.71	6147.55	
Maximum	6150.97	6152.37	6154.69	6156.90	6158.80	6160.07	6160.28	6164.60	6155.08	6155.08	6154.63	6147.55	
Minimum	6147.42	6151.08	6152.48	6154.77	6156.96	6158.80	6160.03	6155.46	6148.35	6145.72	6145.10	6143.77	
Pool Content (EOM) (1000 Ac-Ft)	7.05	7.60	8.54	9.48	10.30	10.86	10.93	8.86	6.09	8.62	5.22	5.82	

ARKANSAS RIVER BASIN

JOHN MARTIN RESERVOIR

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1914 thru 1990	8.76	6.87	7.55	9.04	8.07	6.79	13.85	32.21	51.21	33.13	32 33	9.62	221.39
FY 1990	4.73	7.16	9.07	10.02	10.51	10.51	4.31	18.81	29.69	40.35	15 97	3.82	164.95
Releases (1000 Ac-Ft)													
Avg 1956 thru 1990	11.03	1.45	0.83	0.35	0.88	2.03	24.80	27.84	33.66	38.48	34.58	18.61	194.54
FY 1990	10.02	0.14	0.14	0.14	0.13	0.17	9.30	25.64	44.17	34.00	26.23	14.83	164.91
Rainfall (Inches)													
Avg 1943 thru 1990	0.74	0.39	0.23	0.23	0.27	0.58	0.97	2.14	1.54	2.05	1.80	0.97	11.95
FY 1990	0.18	0.04	0.17	0.76	1.15	0.57	0.25	2.95	1.99	7.44	0.32	2.35	18.17
Pool Elevation (EOM)	3803.88	3806.15	3808.82	3811.60	3814.25	3816.38	3814.71	3812.38	3807.36	3808.69	3804.86	3800.11	
Maximum	3806.05	3806.15	3808.82	3811.60	3814.25	3816.38	3816.79	3814.54	3812.50	3808.69	3803.60	3804.63	
Minimum	3803.76	3803.96	3806.27	3808.91	3811.68	3814.39	3814.71	3812.15	3807.36	3803.80	3804.86	3800.11	
Pool Content (EOM) (1000 Ac-Ft)	28.28	34.86	43.57	53.45	63.66	72.45	65.51	56.37	38.70	43.13	31.02	18.72	

CHENEY RESERVOIR

CHENEY RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1938 THRU 1981	11.66	7.53	6.44	6.63	8.27	13.31	14.69	18.68	17.71	9.29	5.22	9.33	128.8
FY 1990	0.71	0.59	1.63	5.06	8.59	18.76	14.95	15.20	16.47	1.33	3.67	5.83	92.8
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1990	8.28	11.08	3.22	4.00	4.72	10.53	15.03	13.25	12.37	9.18	1.56	2.85	96.1
FY 1990	0.00	0.00	0.00	5.41	8.91	15.91	7.68	11.39	13.66	0.00	0.00	0.00	63.0
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.18	1.30	0.91	0.69	0.93	1.65	2.43	4.03	4.02	3.09	2.95	3.00	27.18
FY 1990	1.08	3.62	0.75	1.28	2.90	2.81	2.77	5.55	2.61	1.16	2.91	5.60	33.04
DEVIATION	-1.10	2.32	-0.16	0.59	1.97	1.16	0.34	1.52	-1.41	-1.93	-0.04	2.60	5.86
POOL ELEVATION													
END OF MONTH	1421.36	1421.29	1421.48	1421.53	1421.47	1421.62	1421.88	1421.95	1421.30	1420.26	1419.93	1419.82	
MAXIMUM	1421.58	1421.40	1421.48	1421.98	1421.86	1421.93	1421.97	1422.13	1422.33	1421.30	1420.29	1419.93	
MINIMUM	1421.34	1421.27	1421.28	1421.48	1421.43	1421.47	1421.57	1421.59	1421.30	1420.26	1419.93	1419.33	
POOL CONTENT-EOM (1000AC.FT)	164.79	164.13	165.93	166.41	165.84	167.26	169.73	170.40	164.22	154.60	151.60	150.64	

ARKANSAS RIVER BASIN

ELDORADO	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1921 THRU 1978	5.00	4.40	2.80	2.70	2.80	6.20	10.20	11.80	14.40	7.40	3.40	5.50	76.6
FY 1990	0.67	0.01	0.17	2.68	4.66	26.29	7.08	9.99	21.34	0.73	4.43	0.78	78.8
RELEASES(1000AC. FT.)													
AVG 1983 THRU 1990	12.11	2.62	5.07	1.97	1.69	7.72	9.59	6.91	7.66	2.22	1.10	1.28	59.9
FY 1990	0.43	0.30	0.31	0.31	0.28	24.42	3.82	3.48	20.17	0.80	0.81	0.65	55.8
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.49	1.67	1.14	0.89	0.97	1.96	2.91	4.34	4.84	3.65	3.18	3.80	31.84
FY 1990	1.82	0.02	0.25	2.14	1.84	4.14	2.30	5.02	5.73	2.23	4.56	2.25	32.30
DEVIATION	-0.67	-1.65	-0.89	1.25	0.87	2.18	-0.61	0.68	0.89	-1.42	1.36	-1.55	0.46
POOL ELEVATION													
END OF MONTH	1339.12	1338.78	1338.57	1338.64	1339.06	1339.10	1339.20	1339.71	1339.06	1338.42	1338.29	1337.65	
MAXIMUM	1339.45	1339.12	1338.78	1338.68	1339.06	1340.29	1339.37	1339.71	1340.13	1339.06	1338.70	1338.29	
MINIMUM	1339.09	1338.78	1338.00	1338.51	1338.60	1339.06	1339.06	1338.98	1339.05	1338.42	1338.29	1337.65	
POOL CONTENT-EOM (1000AC. FT)	157.97	155.27	153.61	154.16	157.48	157.81	158.62	162.77	157.48	152.44	151.41	146.48	

KAW LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1922 THRU 1981	158.53	125.65	84.51	85.12	96.99	171.76	249.25	301.29	342.30	239.71	131.96	141.41	2128.5
FY 1990	123.37	65.75	45.62	98.18	114.64	572.83	169.39	152.53	224.53	37.59	39.47	29.16	1673.1
RELEASES(1000AC. FT.)													
AVG 1977 THRU 1990	185.84	139.19	93.33	117.35	97.85	261.02	336.50	223.63	319.10	234.24	83.41	131.20	2222.6
FY 1990	168.26	75.07	42.64	131.00	77.70	245.38	408.94	114.64	245.53	123.64	34.89	13.43	1681.1
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.39	1.66	1.13	0.87	1.03	1.88	2.86	4.29	4.44	3.50	3.17	3.58	30.80
FY 1990	1.61	1.03	0.42	1.59	2.34	3.92	2.60	3.59	2.85	1.86	2.76	2.82	27.39
DEVIATION	-0.78	-0.63	-0.71	0.72	1.31	2.04	-0.26	-0.70	-1.59	-1.64	-0.41	-0.76	-3.41
POOL ELEVATION													
END OF MONTH	1010.82	1010.00	1010.04	1008.06	1010.13	1025.50	1014.31	1015.89	1014.15	1008.69	1008.42	1008.92	
MAXIMUM	1013.64	1010.82	1010.21	1010.34	1010.13	1026.60	1025.50	1015.89	1017.25	1014.15	1008.69	1009.08	
MINIMUM	1009.93	1009.86	1009.82	1007.95	1007.42	1010.13	1014.08	1013.76	1014.15	1008.49	1008.35	1008.33	
POOL CONTENT-EOM (1000AC. FT)	442.79	428.60	429.29	396.48	430.85	753.75	506.68	537.62	503.59	406.75	402.35	410.50	

ARKANSAS RIVER BASIN

GREAT SALT PLAINS LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1981	21.23	15.25	9.13	9.23	13.13	21.07	31.69	54.65	45.26	22.56	21.24	19.10	283.5
FY 1990	18.57	14.55	13.47	28.76	31.29	54.33	34.87	29.40	20.08	5.95	4.20	5.78	261.3
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	25.31	20.42	11.05	12.12	15.18	38.01	39.99	54.15	55.92	22.87	9.52	14.19	318.7
FY 1990	17.76	12.62	12.48	26.54	25.47	55.15	31.01	28.80	17.67	1.49	1.54	1.43	232.0
RAINFALL(INCHES)													
AVG 1930 THRU 1980	1.87	1.19	0.84	0.69	0.91	1.52	2.35	3.71	3.57	2.54	2.89	2.39	24.47
FY 1990	0.97	0.00	0.40	1.69	2.87	3.11	3.02	3.52	1.54	3.07	2.18	4.78	27.15
DEVIATION	-0.90	-1.19	-0.44	1.00	1.96	1.59	0.67	-0.19	-2.03	0.53	-0.71	2.39	2.68
POOL ELEVATION													
END OF MONTH	1125.36	1125.35	1125.38	1125.53	1126.04	1125.75	1125.84	1125.59	1125.12	1124.92	1124.62	1124.71	
MAXIMUM	1125.75	1125.53	1125.50	1126.12	1126.13	1126.41	1126.07	1125.97	1126.08	1125.12	1125.03	1124.71	
MINIMUM	1125.28	1125.19	1125.22	1125.38	1125.35	1125.49	1125.34	1125.27	1125.12	1124.09	1124.60	1124.08	
POOL CONTENT-EOM (1000AC. FT)	34.76	34.67	34.95	36.34	41.12	38.38	39.22	36.89	32.53	30.77	28.33	29.06	

KEYSTONE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1981	394.68	288.16	175.45	167.90	194.73	336.81	536.34	752.88	738.79	466.47	283.50	328.51	4664.2
FY 1990	365.95	198.94	112.07	280.86	324.69	1730.78	1122.84	713.85	362.97	162.64	82.11	73.19	5530.9
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	509.86	285.24	204.44	223.27	219.56	611.62	702.30	650.36	705.72	458.00	202.16	261.81	5034.3
FY 1990	419.64	211.27	95.09	285.56	236.83	1337.67	1368.72	733.36	400.82	260.22	91.69	84.51	5525.4
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.82	2.56	2.56	0.97	1.15	1.87	2.87	4.41	4.16	3.14	2.99	3.40	33.90
FY 1990	2.30	0.08	0.42	1.83	3.40	5.22	4.30	3.74	1.55	2.17	2.43	3.75	31.19
DEVIATION	-1.52	-2.48	-2.14	0.86	2.25	3.35	1.43	-0.67	-2.61	-0.97	-0.56	0.35	-2.71
POOL ELEVATION													
END OF MONTH	723.64	722.86	723.41	722.98	726.29	738.28	730.67	729.63	727.75	723.42	722.50	721.58	
MAXIMUM	726.05	724.31	723.55	724.38	726.29	745.46	738.28	738.72	729.96	727.88	724.00	722.56	
MINIMUM	722.90	722.75	722.61	722.62	722.98	726.29	726.93	729.35	727.71	723.25	722.50	720.91	
POOL CONTENT-EOM (1000AC. FT)	573.01	554.36	567.47	557.14	640.46	1023.58	766.31	734.87	680.43	567.72	546.02	525.03	

ARKANSAS RIVER BASIN

HEYBURN LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1929 THRU 1981	2.44	2.65	1.50	1.30	1.92	3.24	6.15	7.82	7.59	2.51	1.53	3.77	42.4
FY 1990	1.14	0.02	0.11	2.73	7.02	33.74	24.60	25.75	0.39	0.03	0.03	0.80	96.3
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	3.33	2.50	2.66	2.44	4.64	9.46	6.44	10.74	5.01	0.61	0.06	0.65	48.5
FY 1990	0.00	0.03	0.00	1.68	3.49	34.23	22.36	26.59	0.83	0.00	0.00	0.00	89.2
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.84	2.27	1.49	1.43	1.54	2.33	3.51	4.95	4.32	3.12	2.98	3.99	34.77
FY 1990	3.37	0.05	2.51	4.54	4.09	8.89	7.86	5.58	0.85	0.68	1.66	4.99	45.07
DEVIATION	0.53	-2.22	1.02	3.11	2.55	6.56	4.35	0.63	-3.47	-2.44	-1.32	1.00	10.30
POOL ELEVATION													
END OF MONTH	761.57	761.34	761.35	761.70	764.72	761.82	763.35	762.16	761.43	760.73	760.15	760.32	
MAXIMUM	761.57	761.60	761.36	762.96	764.72	771.07	766.30	767.95	762.16	761.43	760.73	760.41	
MINIMUM	760.42	761.34	761.28	761.35	761.64	761.26	761.29	762.03	761.43	760.73	760.15	759.73	
POOL CONTENT-EOM (1000AC. FT)	7.17	6.97	6.98	7.29	10.44	7.39	8.89	7.71	7.05	6.46	6.00	6.14	

TORONTO LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1922 THRU 1981	19.64	18.97	11.46	12.33	13.35	32.04	46.42	40.55	52.97	34.79	9.13	23.24	314.9
FY 1990	12.37	5.06	1.92	15.02	34.78	117.52	32.33	114.44	59.54	3.28	17.41	0.55	414.2
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	27.61	21.27	15.91	9.77	20.30	47.41	53.93	34.09	60.46	14.79	13.22	15.74	334.5
FY 1990	2.87	14.05	1.55	15.08	16.83	112.63	51.18	28.57	144.50	1.09	17.38	0.30	406.0
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.71	2.05	1.31	1.05	1.05	2.42	3.23	4.63	5.05	3.88	3.36	4.28	35.02
FY 1990	5.40	0.02	0.21	1.87	2.76	6.20	3.38	8.01	4.76	4.03	4.14	1.54	42.32
DEVIATION	2.69	-2.03	-1.10	0.82	1.71	3.78	0.15	3.38	-0.29	0.15	0.78	-2.74	7.30
POOL ELEVATION													
END OF MONTH	904.81	901.52	901.57	901.53	907.12	908.16	902.36	920.35	901.64	901.93	901.47	901.21	
MAXIMUM	904.90	904.81	901.70	905.02	907.12	919.71	908.16	920.44	920.35	901.95	905.33	901.47	
MINIMUM	901.53	901.48	901.52	901.48	901.53	906.51	901.53	902.17	901.55	901.35	901.46	901.14	
POOL CONTENT-EOM (1000AC. FT)	30.58	21.08	21.22	21.11	38.78	42.86	23.37	108.13	21.40	22.17	20.95	20.26	

FALL RIVER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1922 THRU 1981	15.23	14.09	8.25	9.31	10.09	23.68	36.26	33.38	37.93	18.32	6.26	15.10	227.9
FY 1990	7.21	3.44	1.84	13.89	25.30	96.30	20.15	30.24	19.72	0.93	3.96	0.10	223.1
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	18.26	14.80	10.85	8.97	15.01	35.83	41.92	29.46	39.84	17.79	5.89	7.28	245.9
FY 1990	3.95	7.15	0.97	13.98	14.46	88.57	36.46	14.75	32.96	0.99	2.27	0.30	216.8
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.61	1.76	1.23	0.95	1.04	2.17	3.11	4.45	4.86	3.69	3.10	4.03	33.00
FY 1990	3.54	0.01	0.29	1.86	2.40	4.82	2.39	6.14	4.34	2.37	4.49	1.96	34.61
DEVIATION	0.93	-1.75	-0.94	0.91	1.36	2.65	-0.72	1.69	-0.52	-1.32	1.39	-2.07	1.61
POOL ELEVATION													
END OF MONTH	950.16	948.49	948.76	948.64	952.50	954.52	948.89	953.80	948.78	948.15	948.35	947.84	
MAXIMUM	950.28	950.16	948.76	951.70	952.50	965.25	954.52	953.99	953.90	948.79	948.85	948.35	
MINIMUM	948.38	948.48	948.43	948.48	948.52	952.50	948.49	948.84	948.55	948.05	948.12	947.82	
POOL CONTENT-EOM (1000AC. FT)	26.10	21.90	22.54	22.25	32.99	39.90	22.84	37.34	22.58	21.10	21.57	20.40	

ELK CITY LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1922 THRU 1981	18.46	17.90	8.53	10.18	9.80	25.74	41.73	40.68	42.54	21.54	5.05	14.88	257.0
FY 1990	46.29	5.60	2.31	19.10	27.42	154.02	15.97	56.73	28.62	1.10	3.20	2.84	363.2
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	36.20	19.76	13.99	15.73	15.59	47.83	40.17	36.85	52.56	42.02	9.06	7.19	336.9
FY 1990	18.95	32.95	1.04	26.81	13.12	153.62	25.55	22.74	62.34	0.31	0.75	0.30	358.5
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.81	2.22	1.35	1.23	1.17	2.33	3.45	4.71	5.10	3.63	3.15	4.33	35.48
FY 1990	4.98	0.01	0.30	1.60	2.30	5.71	2.60	5.15	3.70	1.70	2.68	4.98	35.71
DEVIATION	2.17	-2.21	-1.05	0.37	1.13	3.38	-0.85	0.44	-1.40	-1.93	-0.47	0.65	0.23
POOL ELEVATION													
END OF MONTH	801.84	796.11	796.32	794.26	797.65	797.45	794.90	801.75	793.97	793.55	793.78	794.11	
MAXIMUM	801.85	801.84	796.32	797.35	797.65	813.47	797.45	801.75	801.85	793.97	794.09	794.15	
MINIMUM	796.00	796.05	796.11	794.26	794.02	797.45	793.65	794.64	793.86	793.43	793.50	793.37	
POOL CONTENT-EOM (1000AC. FT)	74.62	46.61	47.51	39.39	53.41	52.49	41.80	74.13	38.30	36.75	37.60	38.83	

ARKANSAS RIVER BASIN

BIG HILL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1929 THRU 1978	1.69	1.19	0.75	1.05	0.67	1.69	2.30	3.13	3.60	1.73	0.27	1.33	19.4
FY 1990	2.29	0.00	0.00	0.65	1.04	11.75	1.05	9.41	1.83	0.14	0.08	0.37	28.6
RELEASES(1000AC. FT.)													
AVG 1984 THRU 1990	3.36	1.16	0.87	0.46	2.01	4.13	2.71	3.59	2.28	0.28	0.59	0.50	21.9
FY 1990	1.34	0.41	0.00	0.17	0.60	11.52	0.78	7.86	2.78	0.02	0.00	0.00	25.5
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.15	2.50	1.49	1.48	1.33	2.55	3.80	5.19	5.67	3.84	3.33	4.80	39.13
FY 1990	5.58	0.00	0.22	1.80	2.51	10.26	3.43	8.45	3.24	2.00	2.52	4.25	44.26
DEVIATION	2.43	-2.50	-1.27	0.32	1.18	7.71	-0.37	3.26	-2.43	-1.84	-0.81	-0.55	5.13
POOL ELEVATION													
END OF MONTH	858.49	857.87	857.75	858.06	858.36	858.36	858.33	859.31	858.07	857.54	857.14	857.01	
MAXIMUM	859.02	858.49	857.87	858.16	858.36	862.27	858.42	860.13	859.31	858.07	857.54	857.14	
MINIMUM	857.92	857.87	857.67	857.73	858.04	858.28	858.08	858.22	858.07	857.54	857.14	856.78	
POOL CONTENT-EOM (1000AC. FT)	27.80	27.06	26.92	27.28	27.64	27.64	27.61	28.79	27.30	26.67	26.20	26.05	

OOLOGAH LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1981	152.90	138.22	80.40	91.90	84.20	179.83	276.30	289.73	290.68	163.74	51.80	107.14	1906.8
FY 1990	101.53	96.30	7.93	97.78	151.54	968.13	264.89	634.91	452.33	8.12	37.10	14.74	2835.3
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	166.43	144.34	114.01	102.76	114.59	319.65	356.27	229.75	303.13	213.03	47.60	54.14	2165.7
FY 1990	119.67	111.33	4.30	85.26	100.67	574.32	561.78	439.79	687.41	54.66	10.40	2.44	2752.0
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.14	2.42	1.51	1.45	1.33	2.58	3.70	5.03	5.22	3.61	3.31	4.59	37.89
FY 1990	4.37	0.80	1.38	2.18	2.99	8.67	4.59	8.77	4.70	2.17	3.19	3.99	47.80
DEVIATION	1.23	-1.62	-0.13	0.73	1.66	6.09	0.89	3.74	-0.52	-1.44	-0.12	-0.60	9.91
POOL ELEVATION													
END OF MONTH	638.88	638.03	637.89	638.07	639.59	650.01	642.44	647.04	640.02	637.66	637.84	637.70	
MAXIMUM	639.89	639.34	638.20	639.05	639.59	653.48	650.01	647.99	647.04	640.02	638.14	637.84	
MINIMUM	637.76	637.80	637.87	637.87	637.97	639.59	640.90	642.36	640.02	637.28	637.51	637.25	
POOL CONTENT-EOM (1000AC. FT)	579.89	554.32	548.90	554.43	603.23	1000.65	701.00	876.90	617.37	541.95	547.39	543.16	

ARKANSAS RIVER BASIN

HULAH LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1918 THRU 1981	26.93	22.70	9.62	9.63	9.35	24.64	40.30	45.44	38.01	29.02	12.81	25.62	294.1
FY 1990	60.74	14.09	4.79	25.35	34.85	197.45	43.88	112.65	7.99	0.44	1.22	1.37	504.8
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	37.68	23.41	24.64	14.40	14.10	52.18	54.83	46.30	54.99	28.41	5.93	11.46	368.3
FY 1990	35.32	38.04	2.94	21.20	26.27	136.20	102.61	72.93	55.94	0.25	0.25	0.24	492.2
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.89	2.23	1.38	1.24	1.20	2.22	3.48	4.95	4.67	3.42	3.28	4.17	35.13
FY 1990	5.01	0.01	0.19	1.89	2.03	6.49	4.42	5.96	2.01	1.94	2.30	4.25	36.50
DEVIATION	2.12	-2.22	-1.19	0.65	0.83	4.27	0.94	1.01	-2.66	-1.48	-0.98	0.08	1.37
POOL ELEVATION													
END OF MONTH	739.29	733.22	733.37	734.16	736.40	746.83	736.56	743.72	733.23	732.20	731.57	731.19	
MAXIMUM	739.47	739.29	733.37	737.10	736.40	755.26	746.83	748.29	743.72	733.23	732.32	731.57	
MINIMUM	733.03	733.03	733.06	732.98	733.08	736.40	733.02	735.90	732.92	732.20	731.57	730.97	
POOL CONTENT-EOM (1000AC. FT)	57.84	31.97	32.52	35.46	44.53	103.91	45.21	82.70	32.00	28.39	26.30	25.08	

COPAN	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1936 THRU 1977	13.68	13.22	6.94	8.51	7.76	20.51	30.72	34.78	28.28	17.26	4.40	11.59	197.7
FY 1990	45.30	12.50	1.39	13.64	22.44	154.11	43.44	88.26	21.56	0.95	1.15	1.44	406.2
RELEASES(1000AC. FT.)													
AVG 1984 THRU 1990	63.03	26.27	32.01	20.20	15.24	67.52	73.01	46.27	63.23	33.38	2.50	7.64	450.3
FY 1990	25.25	30.69	0.31	13.85	17.67	101.31	84.41	63.05	54.33	0.31	0.31	0.30	391.8
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.04	2.28	1.39	1.33	1.23	2.41	3.51	4.83	4.96	3.44	3.14	3.90	35.46
FY 1990	6.05	0.09	0.53	1.63	3.29	7.40	3.50	6.54	3.26	1.88	1.89	4.53	40.59
DEVIATION	3.01	-2.19	-0.86	0.30	2.06	4.99	-0.01	1.71	-1.70	-1.56	-1.25	0.63	5.13
POOL ELEVATION													
END OF MONTH	713.57	709.98	710.10	709.95	710.80	719.07	712.46	716.25	710.00	709.48	709.13	708.93	
MAXIMUM	713.57	713.80	710.11	711.71	711.05	725.43	719.07	719.12	716.25	710.00	709.48	709.13	
MINIMUM	709.94	709.88	709.96	709.85	709.95	710.80	710.07	712.19	709.95	709.46	709.13	708.71	
POOL CONTENT-EOM (1000AC. FT)	62.56	43.32	43.91	43.18	47.41	98.89	56.24	79.22	43.42	40.97	39.33	38.40	

ARKANSAS RIVER BASIN

BIRCH LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1936 THRU 1979	2.40	1.65	1.02	0.96	0.96	3.02	3.18	5.61	3.12	1.78	0.82	1.95	26.5
FY 1990	1.30	0.21	0.21	1.12	6.62	20.56	7.96	9.42	3.89	0.23	0.43	0.74	52.7
RELEASES(1000AC. FT.)													
AVG 1979 THRU 1990	3.65	1.75	1.77	1.47	2.22	6.50	3.82	5.57	4.31	1.00	0.56	0.83	33.4
FY 1990	1.08	0.22	0.06	0.85	3.81	23.74	4.65	12.08	3.35	0.53	0.56	0.51	51.4
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.78	2.16	1.43	1.27	1.33	2.43	3.31	5.00	4.52	3.16	3.29	4.25	34.93
FY 1990	2.56	0.90	1.36	1.90	4.57	7.99	7.79	5.90	4.00	1.50	2.56	4.53	45.56
DEVIATION	-0.22	-1.26	-0.07	0.63	3.24	5.56	4.48	0.90	-0.52	-1.66	-0.73	0.28	10.63
POOL ELEVATION													
END OF MONTH	750.62	750.35	750.36	750.50	753.74	750.83	753.20	750.59	750.47	749.64	749.01	748.81	
MAXIMUM	750.72	750.62	750.37	751.20	753.74	763.47	758.40	754.99	752.94	750.47	749.65	749.01	
MINIMUM	749.69	750.30	750.30	750.36	750.28	750.44	750.37	750.57	750.28	749.64	749.01	748.46	
POOL CONTENT-EOM (1000AC. FT)	19.32	19.01	19.03	19.18	23.03	19.56	22.37	19.29	19.15	18.22	17.52	17.30	

SKIATOOK LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1935 THRU 1978	13.47	8.09	3.91	3.61	4.29	12.59	15.35	28.43	16.19	10.64	4.09	12.37	133.0
FY 1990	4.57	0.06	0.00	5.86	30.50	116.08	42.61	40.66	11.76	0.41	2.63	3.95	259.1
RELEASES(1000AC. FT.)													
AVG 1989 THRU 1990	5.22	2.36	1.41	0.91	3.47	48.25	32.67	28.51	6.14	7.67	19.00	14.22	169.9
FY 1990	5.68	2.85	2.22	1.28	6.08	95.89	61.31	52.61	10.40	8.29	8.32	8.33	263.3
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.88	2.21	1.41	1.32	1.36	2.37	3.30	4.83	4.38	3.24	3.25	4.19	34.74
FY 1990	2.87	0.34	0.81	1.96	3.60	8.18	7.86	5.41	2.75	1.42	4.11	4.24	43.55
DEVIATION	-0.01	-1.87	-0.60	0.64	2.24	5.81	4.56	0.58	-1.63	-1.82	0.86	0.05	8.81
POOL ELEVATION													
END OF MONTH	713.58	713.02	712.60	712.98	715.89	717.55	715.53	714.08	713.92	712.60	711.63	710.84	
MAXIMUM	713.88	713.58	713.02	713.02	715.89	723.30	717.55	716.88	714.42	713.92	712.60	711.63	
MINIMUM	713.07	712.71	712.55	712.54	712.98	715.40	714.05	714.02	713.70	712.60	711.63	710.79	
POOL CONTENT-EOM (1000AC. FT)	318.46	312.76	308.51	312.36	342.35	360.15	338.58	323.56	321.92	308.51	298.74	290.93	

NEWT GRAHAM LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1957	306.03	159.47	104.65	137.73	123.85	203.04	501.27	562.13	549.77	233.60	99.67	137.64	3118.9
FY 1990	231.32	239.50	36.79	182.58	278.58	1472.23	1112.53	882.74	884.53	88.36	38.58	42.94	5490.7
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	317.38	282.06	241.49	204.29	257.47	600.52	614.70	515.84	535.31	316.22	91.63	117.87	4094.8
FY 1990	230.73	238.82	36.41	183.41	277.33	1472.61	1112.71	881.43	883.86	87.52	37.87	42.67	5485.4
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.12	2.36	1.54	1.46	1.47	2.53	3.61	4.88	4.73	3.28	3.20	4.32	36.50
FY 1990	3.14	0.37	0.43	2.42	3.49	8.37	6.81	5.65	2.88	1.46	2.19	4.29	41.50
DEVIATION	0.02	-1.99	-1.11	0.96	2.02	5.84	3.20	0.77	-1.85	-1.82	-1.01	-0.03	5.00
POOL ELEVATION													
END OF MONTH	532.50	532.72	532.76	532.14	532.88	532.44	532.04	532.58	532.49	532.59	532.74	532.58	
MAXIMUM	532.99	532.86	533.00	532.99	533.40	533.35	532.96	532.95	532.86	532.87	532.96	532.99	
MINIMUM	531.80	532.04	532.07	531.59	531.79	528.00	531.19	531.26	531.63	532.30	532.31	532.27	
POOL CONTENT-EOM (1000AC. FT)	24.30	24.64	24.70	23.76	24.88	24.21	23.61	24.43	24.29	24.44	24.67	24.43	

CHOUTEAU LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1957	306.03	159.47	104.65	137.73	123.85	203.31	501.22	562.13	549.77	233.60	99.67	137.64	3119.1
FY 1990	199.64	244.21	34.26	206.97	302.28	1564.46	1239.07	982.91	968.43	96.30	35.31	44.78	5918.6
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	308.85	286.82	247.31	208.17	263.12	615.68	633.65	524.77	553.60	306.40	84.79	109.57	4142.7
FY 1990	198.51	243.68	33.61	207.48	301.47	1563.94	1238.71	981.91	967.15	94.08	34.21	43.78	5908.5
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.40	2.83	2.00	1.90	1.99	2.91	4.15	5.22	5.06	3.06	2.93	4.16	39.61
FY 1990	1.75	0.54	0.33	4.54	4.05	8.51	9.97	5.22	1.01	1.60	2.42	5.77	45.71
DEVIATION	-1.65	-2.29	-1.67	2.64	2.06	5.60	5.82	0.00	-4.05	-1.46	-0.51	1.61	6.10
POOL ELEVATION													
END OF MONTH	511.47	511.41	511.54	511.32	511.60	511.57	511.38	511.39	511.32	511.59	511.34	511.39	
MAXIMUM	511.63	511.57	511.63	511.68	511.92	514.84	511.78	511.69	511.68	511.86	511.66	511.88	
MINIMUM	511.07	511.13	511.18	511.19	511.18	510.82	511.01	511.06	511.14	511.04	510.58	511.28	
POOL CONTENT-EOM (1000AC. FT)	23.45	23.31	23.61	23.10	23.75	23.68	23.24	23 26	23.10	23.73	23.14	23.26	

COUNCIL GROVE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1922 THRU 1981	5.97	4.43	2.97	2.79	3.75	7.35	10.32	12.52	16.44	12.31	5.02	7.52	91.4
FY 1990	0.43	0.25	0.54	0.85	1.80	10.47	4.52	10.12	4.90	0.69	3.42	0.96	28.0
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	5.80	3.36	3.55	1.60	3.51	9.48	10.78	10.47	12.26	10.91	1.69	2.76	75.4
FY 1990	0.44	0.51	0.12	0.12	0.11	5.71	5.18	7.89	4.28	0.50	0.54	0.65	26.3
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.59	1.63	1.19	0.86	0.91	1.99	3.10	4.60	4.92	3.83	3.54	3.86	33.02
FY 1990	1.88	0.00	0.12	1.79	2.08	4.55	3.71	4.84	4.33	1.93	3.54	0.88	29.65
DEVIATION	-0.71	-1.63	-1.07	0.93	1.17	2.56	0.61	0.24	-0.59	-1.90	0.00	-2.98	-3.37
POOL ELEVATION													
END OF MONTH	1272.81	1272.41	1272.35	1272.49	1272.95	1274.34	1273.89	1274.30	1274.03	1273.55	1273.97	1273.00	
MAXIMUM	1273.10	1272.81	1272.41	1272.51	1272.95	1275.15	1274.34	1275.16	1274.50	1274.03	1274.23	1273.97	
MINIMUM	1272.64	1272.41	1272.31	1272.35	1272.48	1272.95	1273.89	1273.88	1273.78	1273.45	1273.50	1273.00	
POOL CONTENT-EOM (1000AC. FT)	44.84	43.59	43.41	43.84	45.27	49.80	48.31	49.67	48.77	47.21	48.57	45.43	

MARION LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1938 THRU 1971	3.16	1.28	1.49	1.94	2.08	3.31	5.91	8.70	10.17	7.13	1.78	4.79	51.7
FY 1990	0.14	0.09	0.98	0.26	0.87	3.39	2.15	5.71	3.09	0.71	2.04	0.06	19.5
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	2.93	3.40	3.28	1.65	2.25	4.48	6.59	6.98	5.79	7.25	1.92	1.41	47.9
FY 1990	0.31	0.35	0.15	0.31	0.28	0.31	0.30	0.31	0.61	0.74	0.31	0.30	4.3
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.50	1.57	07	0.80	0.96	1.88	2.75	4.45	4.68	3.82	3.26	3.73	31.47
FY 1990	0.98	0.00	0.17	1.07	2.21	4.89	3.41	5.20	2.83	2.21	3.57	1.40	27.94
DEVIATION	-1.52	-1.57	-0.90	0.27	1.25	3.01	0.66	0.75	-1.85	-1.61	0.31	-2.33	-3.53
POOL ELEVATION													
END OF MONTH	1346.29	1345.89	1345.86	1345.73	1345.77	1346.27	1346.35	1347.09	1346.99	1346.34	1346.14	1345.59	
MAXIMUM	1346.65	1346.29	1345.89	1345.86	1345.81	1346.27	1346.39	1347.09	1347.24	1346.99	1346.47	1346.14	
MINIMUM	1346.19	1345.86	1345.81	1345.58	1345.71	1345.75	1346.25	1346.28	1346.91	1346.34	1346.14	1345.59	
POOL CONTENT-EOM (1000AC. FT)	56.52	54.49	54.35	53.72	53.91	56.42	56.83	60.67	60.13	56.78	55.75	53.05	

ARKANSAS RIVER BASIN

JOHN REDMOND DAM AND RES	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1922 THRU 1981	71.02	55.44	38.04	36.84	40.33	87.60	126.29	136.01	165.24	118.01	39.59	70.27	984.7
FY 1990	33.82	15.27	11.01	17.95	36.89	174.35	80.33	252.30	246.15	16.66	18.25	8.92	911.9
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	71.40	63.42	48.09	29.77	51.84	120.68	154.92	129.12	169.84	120.77	36.02	47.34	1043.2
FY 1990	7.51	5.26	10.46	47.12	32.23	153.68	98.42	97.47	343.79	53.30	19.77	7.30	876.3
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.63	1.69	1.18	0.90	0.96	2.06	2.99	4.44	4.89	3.82	3.40	4.04	33.00
FY 1990	1.87	0.00	0.12	1.75	1.80	4.53	3.66	4.70	4.16	1.98	3.51	0.87	28.95
DEVIATION	-0.76	-1.69	-1.06	0.85	0.84	2.47	0.67	0.26	-0.73	-1.84	0.11	-3.17	-4.05
POOL ELEVATION													
END OF MONTH	1041.50	1042.15	1042.00	1038.97	1039.38	1041.32	1039.25	1051.26	1043.71	1039.64	1039.06	1038.89	
MAXIMUM	1041.50	1042.33	1042.15	1042.15	1040.13	1048.02	1041.32	1051.26	1053.52	1043.71	1039.66	1039.08	
MINIMUM	1039.00	1041.50	1041.97	1038.84	1038.83	1039.07	1038.37	1038.99	1043.71	1038.99	1039.00	1038.79	
POOL CONTENT-EOM (1000AC. FT)	89.02	95.65	94.07	63.96	67.97	87.20	66.70	218.25	112.33	70.52	64.84	63.20	

PENSACOLA LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1981	322.60	323.22	236.46	249.34	281.52	462.47	648.79	692.47	729.00	403.86	171.64	260.79	4782.2
FY 1990	101.65	102.45	33.72	266.68	437.16	2056.66	807.87	2326.61	1533.22	207.47	120.20	87.47	8081.2
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	367.40	396.40	381.89	281.81	368.42	719.12	755.54	596.41	567.56	418.93	222.64	212.23	5288.3
FY 1990	111.97	80.83	81.74	82.08	433.35	1795.00	921.27	2237.04	1628.69	274.71	212.59	93.84	7953.1
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.39	2.71	1.89	1.73	1.73	2.91	4.02	5.15	5.26	3.58	3.39	4.64	40.40
FY 1990	2.94	0.13	0.38	3.33	4.05	15.13	5.86	11.94	6.04	2.11	2.95	4.23	59.09
DEVIATION	-0.45	-2.58	-1.51	1.60	2.32	12.22	1.84	6.79	0.78	-1.47	-0.44	-0.41	18.69
POOL ELEVATION													
END OF MONTH	741.83	742.07	740.82	744.85	744.78	749.98	747.47	748.96	746.49	744.44	741.87	741.35	
MAXIMUM	742.44	742.75	742.07	745.05	745.12	754.38	749.98	751.79	750.99	746.49	744.63	742.05	
MINIMUM	741.66	741.83	740.70	740.65	744.22	744.78	745.76	747.03	746.47	744.37	741.87	741.34	
POOL CONTENT-EOM (1000AC. FT)	1529.69	1540.08	1486.44	1665.10	1661.88	1915.98	1790.03	1864.00	1742.52	1646.24	1531.41	1509.05	

ARKANSAS RIVER BASIN

LAKE HUDSON	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1981	366.07	326.50	276.23	277.65	316.68	493.77	703.76	798.60	797.85	469.55	232.23	292.51	5351.4
FY 1990	132.69	87.39	85.76	111.97	531.87	2158.41	1164.49	2457.52	1763.31	288.99	225.12	107.11	9114.6
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	397.26	455.74	449.77	334.81	429.93	843.16	923.44	686.18	684.08	446.16	227.50	225.43	6103.5
FY 1990	127.79	81.00	87.09	111.11	520.76	2061.32	1237.37	2392.44	1809.89	313.09	220.46	95.96	9058.3
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.78	3.02	2.17	1.94	2.08	3.16	4.26	5.47	5.21	3.23	3.42	4.66	42.40
FY 1990	2.36	0.63	0.61	4.25	4.68	9.88	8.93	8.50	5.23	1.20	2.37	6.22	54.86
DEVIATION	-1.42	-2.39	-1.56	2.31	2.60	6.72	4.67	3.03	0.02	-2.03	-1.05	1.56	12.46
POOL ELEVATION													
END OF MONTH	619.27	619.58	619.31	619.24	620.07	627.57	621.68	626.47	622.25	619.56	619.49	620.19	
MAXIMUM	619.67	619.61	619.71	619.51	620.07	635.49	627.57	631.04	626.89	622.61	620.05	620.19	
MINIMUM	619.08	619.07	619.17	618.94	618.97	619.27	618.92	621.68	621.07	618.85	618.83	618.97	
POOL CONTENT-EOM (1000AC. FT)	203.28	206.71	203.73	202.95	212.15	306.92	230.73	291.64	237.52	206.49	205.71	213.51	

FORT GIBSON LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1980	392.66	377.51	305.41	312.54	355.69	546.77	797.48	887.79	880.74	507.86	248.96	323.89	5937.3
FY 1990	126.94	78.15	81.72	162.17	570.84	2286.35	1413.82	2433.72	1794.05	294.58	206.48	85.09	9533.9
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	449.93	472.83	495.50	391.05	412.44	923.06	1016.19	725.45	728.97	485.55	214.67	218.69	6534.3
FY 1990	99.03	76.40	84.33	149.55	527.42	1977.96	1459.35	2338.02	2117.39	328.97	184.78	77.72	9420.9
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.63	2.96	2.16	1.97	2.13	3.14	4.26	5.40	5.12	3.05	3.21	4.39	41.42
FY 1990	1.85	3.81	0.42	4.86	4.72	9.13	9.93	6.69	2.44	1.17	2.41	6.52	53.95
DEVIATION	-1.78	0.85	-1.74	2.89	2.59	5.99	5.67	1.29	-2.68	-1.88	-0.80	2.13	12.53
POOL ELEVATION													
END OF MONTH	554.40	554.25	554.01	554.42	556.38	568.05	566.30	568.99	556.12	553.83	554.46	554.54	
MAXIMUM	554.89	554.42	554.73	555.10	557.65	579.90	568.05	571.59	569.48	556.12	555.08	554.96	
MINIMUM	553.24	553.56	553.60	553.87	554.25	555.40	557.64	562.73	555.93	552.78	553.55	553.11	
POOL CONTENT-EOM (1000AC. FT)	372.92	370.02	365.39	373.30	412.44	713.51	659.87	743.78	407.01	362.02	374.08	375.62	

ARKANSAS RIVER BASIN

WEBBERS FALLS L&D	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1940 THRU 1981	1163.75	1067.84	732.82	668.85	751.95	1291.80	1905.47	2350.06	1996.12	1593.36	687.71	627.23	14837.0
FY 1990	711.87	502.21	196.16	603.77	1061.55	5600.33	4679.60	4483.64	3440.33	647.60	294.15	228.8[illegible]	22450.1
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	1386.35	1193.14	1066.75	906.11	990.19	2485.99	2663.71	2135.35	2220.94	1289.53	509.55	595.32	17442.9
FY 1990	701.03	496.52	189.70	617.49	1042.57	5614.85	4663.04	4481.02	3435.23	643.19	297.55	213.34	22395.5
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.41	2.83	2.08	1.91	2.12	2.97	4.26	5.28	5.09	3.01	2.94	4.21	40.11
FY 1990	1.97	1.24	0.82	4.43	4.17	8.93	10.20	7.56	1.29	1.49	2.53	5.02	49.65
DEVIATION	-1.44	-1.59	-1.26	2.52	2.05	5.96	5.94	2.28	-3.80	-1.52	-0.41	0.81	9.54
POOL ELEVATION													
END OF MONTH	489.69	489.88	490.21	488.78	490.23	488.70	489.83	489.70	489.55	489.42	488.71	489.69	
MAXIMUM	490.27	490.34	490.21	490.30	490.35	490.35	490.89	490.48	490.39	490.33	490.87	490.28	
MINIMUM	489.02	488.35	488.70	488.49	488.62	488.50	488.35	488.03	489.30	488.12	487.61	487.81	
POOL CONTENT-EOM (1000AC. FT)	166.58	168.74	172.65	156.36	172.90	155.50	168.17	166.70	164.99	163.51	155.61	166.58	

TENKILLER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1981	52.66	73.08	76.11	82.05	97.10	136.73	174.34	188.34	119.59	53.49	40.27	35.47	1129.2
FY 1990	12.00	9.84	9.32	92.23	192.59	405.62	452.03	608.53	128.53	33.52	23.90	34.12	2002.2
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	56.34	49.63	85.10	92.43	75.44	123.54	177.12	139.07	87.14	54.56	40.73	26.15	1007.3
FY 1990	13.62	5.76	9.42	50.73	198.57	186.01	494.15	682.70	198.23	71.82	39.33	25.31	1975.7
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.62	3.17	2.58	2.22	2.66	3.52	4.59	5.65	4.89	3.15	3.29	4.32	43.66
FY 1990	1.17	0.99	0.58	5.87	5.62	10.27	11.54	11.45	3.29	0.79	2.68	6.97	61.22
DEVIATION	-2.45	-2.18	-2.00	3.65	2.96	6.75	6.95	5.80	-1.60	-2.36	-0.61	2.65	17.56
POOL ELEVATION													
END OF MONTH	631.85	631.95	631.81	634.82	634.20	649.22	646.28	640.98	635.55	632.13	630.54	630.97	
MAXIMUM	632.25	632.02	632.06	635.91	636.31	651.79	649.22	662.52	641.08	635.55	632.16	631.13	
MINIMUM	631.70	631.76	631.69	631.79	633.93	634.20	635.47	640.98	635.09	631.76	630.54	629.76	
POOL CONTENT-EOM (1000AC. FT)	652.13	653 44	651.61	691.04	682.92	902.49	856.37	776.90	700.82	655.80	635.34	640.63	

ARKANSAS RIVER BASIN

CONCHAS LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1940 thru 1990	9.40	3.74	3.59	3.76	4.19	4.32	15.15	28.00	23.35	23.25	27.70	20.43	166.89
FY 1990	1.03	1.04	1.28	2.57	4.48	5.91	2.36	4.35	3.86	13.63	38.16	6.90	85.57
Releases (1000 Ac-Ft)													
Avg 1941 thru 1990	8.33	1.88	1.55	0.62	1.01	2.41	14.35	18.20	15.43	17.46	17.65	19.38	118.27
FY 1990	9.67	0.37	0.15	0.00	0.02	0.00	5.74	14.57	16.72	12.48	11.97	11.05	82.74
Rainfall (Inches)													
Avg 1940 thru 1990	1.05	0.50	0.45	0.34	0.43	0.62	0.84	1.59	1.65	2.41	2.51	1.37	13.70
FY 1990	0.44	0.00	0.22	0.68	1.38	0.90	0.22	0.55	0.28	3.79	5.74	2.84	17.04
Pool Elevation (EOM)	4188.34	4188.02	4187.99	4188.19	4188.60	4189.03	4188.08	4185.82	4182.62	4182.05	4185.89	4184.86	
Maximum	4190.03	4188.29	4188.03	4188.19	4188.60	4189.03	4189.03	4188.02	4185.71	4182.48	4186.24	[illegible]	
Minimum	4188.34	4188.02	4187.94	4187.99	4188.19	4188.63	4188.08	4185.82	4182.62	4180.84	4181.93	4184.74	
Pool Content (EOM) (1000 Ac-Ft)	211.72	209.55	209.35	210.70	213.50	216.48	209.95	195.11	175.51	172.19	195.55	189.06	

SANFORD RESERVOIR

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1981	21.36	3.42	1.97	3.18	2.09	2.58	11.47	35.88	38.51	37.66	35.93	30.86	224.9
FY 1990	0.77	0.59	0.79	3.85	4.16	5.53	3.43	1.98	0.59	4.19	4.13	14.20	44.2
RELEASES(1000AC.FT.)													
LAKE HAS NOT FILLED													
RAINFALL(INCHES)													
AVG 1930 THRU 1980	1.32	0.60	0.49	0.45	0.48	0.68	1.14	2.52	2.36	2.68	2.48	[illegible]	16.82
FY 1990	0.44	0.02	0.59	0.91	1.60	2.18	3.30	2.39	1.48	2.88	4.23	[illegible]	23.59
DEVIATION	-0.88	-0.58	0.10	0.46	1.12	1.50	2.16	-0.13	-0.88	0.20	1.75	1.95	6.77
POOL ELEVATION													
END OF MONTH	2900.74	2900.85	2900.49	2900.24	2900.17	2900.07	2899.63	2898.61	2897.02	2895.97	2895.11	2895.58	
MAXIMUM	2902.12	2900.86	2900.86	2900.49	2900.26	2900.29	2900.07	2899.63	2898.65	2897.02	2895.97	2895.66	
MINIMUM	2900.74	2900.47	2900.49	2900.20	2899.99	2899.99	2899.63	2898.61	2897.02	2895.97	2895.11	2894.22	
POOL CONTENT-EOM (1000AC.FT)	363.40	364.48	360.95	358.49	357.80	356.82	352.56	342.76	327.77	318.09	310.28	314.55	

ARKANSAS RIVER BASIN

NORMAN RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1926 THRU 1961	3.80	0.90	1.60	1.10	2.10	4.20	9.50	13.70	12.10	4.40	0.70	2.40	56.5
FY 1990	5.70	1.19	1.57	5.59	11.02	45.63	37.00	43.14	2.86	3.37	3.53	6.82	167.4
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1990	3.53	3.88	1.25	2.51	2.02	7.40	7.31	7.44	8.30	2.78	0.59	0.[illegible]	47.4
FY 1990	2.13	0.00	0.00	2.77	2.82	30.97	20.29	55.23	14.92	0.00	0.00	0.[illegible]	29.1
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.89	2.07	1.51	1.32	1.54	2.23	3.48	5.50	4.35	2.90	2.60	3.48	33.87
FY 1990	2.74	0.74	0.24	2.03	4.45	7.41	7.96	6.20	0.87	2.89	3.14	4.50	43.17
DEVIATION	-0.15	-1.33	-1.27	0.71	2.91	5.18	4.48	0.70	-3.48	-0.01	0.54	1.02	9.30
POOL ELEVATION													
END OF MONTH	1039.19	1039.03	1038.97	1039.03	1040.02	1041.86	1043.77	1041.42	1038.64	1038.31	1038.12	1038.60	
MAXIMUM	1039.52	1039.20	1039.03	1039.98	1040.02	1044.67	1043.85	1048.38	1041.42	1038.64	1038.49	1038.72	
MINIMUM	1038.89	1039.03	1038.92	1038.97	1039.03	1039.26	1039.00	1041.42	1038.64	1038.00	1038.12	1037.66	
POOL CONTENT-EOM (1000AC.FT)	120.76	119.78	119.42	119.78	125.83	137.88	151.27	134.97	117.44	115.46	114.32	117.20	

OPTIMA LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1939 THRU 1981	2.10	0.82	0.96	0.89	1.05	1.05	1.57	5.60	6.75	3.77	3.36	3.30	31.2
FY 1990	0.09	0.03	0.01	0.12	0.09	0.22	1.68	0.35	0.04	0.03	0.05	0.08	2.8
RELEASES(1000AC.FT.)													
LAKE HAS NOT FILLED													
RAINFALL(INCHES)													
AVG 1930 THRU 1980	1.13	0.59	0.40	0.37	0.42	0.77	1.23	2.64	2.25	2.69	2.41	1.62	16.52
FY 1990	0.31	0.01	0.37	0.69	1.10	1.54	3.00	2.60	1.03	2.69	2.05	3.00	18.39
DEVIATION	-0.82	-0.58	-0.03	0.32	0.68	0.77	1.77	-0.04	-1.22	0.00	-0.36	1.38	1.87
POOL ELEVATION													
END OF MONTH	2717.95	2717.70	2717.60	2717.60	2717.60	2717.65	2719.50	2719.30	2718.45	2717.65	2716.95	2716.55	
MAXIMUM	2718.25	2717.95	2717.70	2717.65	2717.60	2717.65	2719.50	2719.60	2719.30	2718.45	2717.65	2716.95	
MINIMUM	2717.95	2717.70	2717.60	2717.60	2717.55	2717.60	2717.55	2719.20	2718.45	2717.65	2716.95	2716.50	
POOL CONTENT-EOM (1000AC.FT)	3.08	2.91	2.84	2.84	2.84	2.88	4.30	4.13	3.45	2.88	2.42	2.20	

ARKANSAS RIVER BASIN

FORT SUPPLY LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1981	5.96	3.34	1.83	1.92	3.26	3.01	4.63	12.05	11.42	4.28	3.50	3.59	58.8
FY 1990	2.59	2.94	3.20	3.85	3.97	6.00	7.76	5.71	2.76	1.34	1.10	1.08	42.3
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	1.75	1.44	1.56	2.07	2.37	3.39	3.47	7.93	3.73	0.88	0.52	0.73	29.8
FY 1990	1.78	2.50	2.90	4.21	3.38	5.53	6.50	5.10	1.53	0.31	0.31	0.30	34.3
RAINFALL(INCHES)													
AVG 1930 THRU 1980	1.92	1.06	0.74	0.64	0.88	1.30	2.25	4.23	3.11	1.98	2.44	2.25	22.80
FY 1990	0.49	0.00	0.41	1.03	2.37	3.82	3.44	2.39	2.18	1.73	1.50	4.12	23.48
DEVIATION	-1.43	-1.06	-0.33	0.39	1.49	2.52	1.19	-1.84	-0.93	-0.25	-0.94	1.87	0.68
POOL ELEVATION													
END OF MONTH	2004.09	2004.05	2004.13	2003.89	2004.10	2004.10	2004.36	2004.20	2004.08	2003.91	2003.65	2003.56	
MAXIMUM	2004.19	2004.18	2004.20	2004.20	2004.28	2004.28	2004.61	2004.36	2004.30	2004.09	2003.95	2003.65	
MINIMUM	2003.95	2003.97	2003.96	2003.89	2003.81	2003.91	2003.92	2003.80	2003.96	2003.71	2003.65	2003.32	
POOL CONTENT-EOM (1000AC. FT)	14.06	13.99	14.14	13.69	14.08	14.08	14.59	14.28	14.04	13.73	13.26	13.09	

CANTON LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1981	18.09	5.83	3.94	4.22	5.63	8.35	13.59	34.74	36.74	27.60	9.76	11.25	179.7
FY 1990	9.02	8.61	8.05	11.88	12.88	18.11	25.82	23.80	10.03	1.88	2.82	2.78	135.7
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	3.39	4.99	5.73	4.47	3.92	7.44	12.68	7.74	14.93	10.99	6.55	5.88	88.7
FY 1990	7.15	7.35	7.15	11.74	10.24	16.45	14.97	28.56	8.26	3.37	3.25	2.98	121.5
RAINFALL(INCHES)													
AVG 1930 THRU 1980	1.46	0.91	0.60	0.54	0.71	1.13	1.64	3.37	2.80	2.56	2.49	1.79	20.00
FY 1990	0.29	0.00	0.29	0.96	2.68	2.67	3.71	3.17	1.23	2.57	1.50	3.27	22.34
DEVIATION	-1.17	-0.91	-0.31	0.42	1.97	1.54	2.07	-0.20	-1.57	0.01	-0.99	1.48	2.34
POOL ELEVATION													
END OF MONTH	1615.56	1615.46	1615.46	1615.33	1615.55	1615.53	1616.56	1615.60	1615.12	1614.31	1613.69	1613.26	
MAXIMUM	1615.83	1615.61	1615.66	1615.63	1615.61	1615.68	1616.58	1616.75	1615.61	1615.12	1614.31	1613.69	
MINIMUM	1615.37	1615.40	1615.35	1615.27	1615.26	1615.31	1615.35	1615.48	1615.12	1614.31	1613.69	1613.23	
POOL CONTENT-EOM (1000AC. FT)	112.62	111.83	111.83	110.80	112.54	112.39	120.75	112.94	109.13	102.90	98.25	95.09	

ARKANSAS RIVER BASIN

ARCADIA LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1938 THRU 1982	1.91	1.63	0.96	1.36	1.39	2.43	3.60	7.60	5.08	2.06	1.03	1.99	28.1
FY 1990	4.62	1.34	1.10	3.30	7.75	12.48	12.30	22.31	3.10	1.00	1.82	7.22	78.4
RELEASES(1000AC. FT.)													
AVG 1989 THRU 1990	3.03	2.80	0.51	1.38	1.70	3.77	5.63	16.80	13.29	2.71	7.83	13.18	72.7
FY 1990	2.27	2.42	1.02	2.77	3.40	7.39	10.03	28.40	4.42	0.00	0.66	4.91	67.7
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.74	1.93	1.47	1.24	1.45	2.16	3.22	5.32	4.25	2.77	2.55	3.38	32.48
FY 1990	3.19	2.89	0.30	1.66	6.58	7.92	8.14	8.12	4.48	1.01	2.37	5.78	52.44
DEVIATION	0.45	0.96	-1.17	0.42	5.13	5.76	4.92	2.80	0.23	-1.76	-0.18	2.40	19.96
POOL ELEVATION													
END OF MONTH	1007.15	1006.25	1006.12	1006.15	1008.23	1010.37	1011.05	1007.61	1006.15	1005.91	1005.84	1006.53	
MAXIMUM	1007.25	1007.15	1006.25	1007.37	1008.23	1012.93	1011.05	1014.63	1007.61	1006.15	1006.44	1008.77	
MINIMUM	1006.01	1006.06	1005.99	1006.07	1006.02	1008.23	1006.05	1007.61	1005.97	1005.71	1005.84	1005.53	
POOL CONTENT-EOM (1000AC. FT)	29.72	28.04	27.79	27.85	31.81	36.21	37.67	30.60	27.85	27.41	27.28	28.55	

EUFAULA LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1923 THRU 1981	332.38	246.54	202.92	218.39	262.49	353.60	526.38	766.88	603.75	252.71	144.26	212.12	4122.4
FY 1990	86.68	81.12	49.19	456.79	575.80	2520.79	2598.15	2970.25	222.74	82.51	115.34	304.96	10064.3
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	149.48	221.35	207.85	298.79	273.96	517.47	502.15	709.59	594.85	240.40	150.97	95.58	3962.4
FY 1990	193.24	58.96	28.38	332.60	514.92	1585.79	2092.06	3848.75	650.92	136.90	144.21	133.94	9720.7
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.15	2.45	1.89	1.64	1.98	2.72	3.85	5.54	4.42	3.03	2.80	3.90	37.37
FY 1990	2.42	0.50	2.13	4.13	4.64	9.10	12.44	10.38	1.94	3.31	3.61	7.17	61.77
DEVIATION	-0.73	-1.95	0.24	2.49	2.66	6.38	8.59	4.84	-2.48	0.28	0.81	3.27	24.40
POOL ELEVATION													
END OF MONTH	584.88	584.88	584.98	585.92	586.32	593.74	597.05	590.21	586.00	584.95	584.19	585.44	
MAXIMUM	586.18	585.07	585.00	587.45	586.85	596.36	598.01	599.77	590.21	586.02	585.23	585.50	
MINIMUM	584.71	584.84	584.78	584.86	585.57	586.32	586.80	586.63	586.00	584.54	584.19	583.78	
POOL CONTENT-EOM (1000AC. FT)	2302.11	2302.11	2312.49	2413.29	2457.36	3362.87	3832.80	2909.38	2421.88	2309.38	2230.49	2361.78	

ARKANSAS RIVER BASIN

R. S. KERR LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1943 THRU 1981	1283.00	1231.74	1064.24	964.67	1176.02	1963.52	2466.04	3141.04	2757.85	2170.09	986.93	1279.80	20484.9
FY 1990	950.08	582.15	246.94	1084.36	2077.29	7757.95	7827.97	10056.60	4492.76	916.76	504.60	442.91	36940.4
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	1657.35	1523.61	1450.62	1356.49	1452.54	3268.37	3474.97	3230.29	3018.28	1567.23	697.93	722.12	23419.8
FY 1990	963.66	575.96	223.12	1065.14	2069.13	7820.76	7752.93	10111.12	4485.19	888.66	481.56	434.44	36871.7
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.60	3.07	2.57	2.13	2.61	3.43	4.54	5.61	4.69	3.16	3.15	4.19	42.75
FY 1990	1.37	0.73	0.56	5.18	5.87	8.85	14.20	13.24	1.65	2.55	3.95	4.96	63.11
DEVIATION	-2.23	-2.34	-2.01	3.05	3.26	5.42	9.66	7.63	-3.04	-0.61	0.80	0.77	20.36
POOL ELEVATION													
END OF MONTH	459.70	459.60	460.00	460.25	460.24	458.50	459.98	460.20	459.82	459.85	459.90	459.78	
MAXIMUM	460.38	460.20	460.20	460.55	460.57	460.66	460.83	461.06	460.35	459.96	460.19	460.26	
MINIMUM	458.88	459.40	459.60	459.43	459.26	458.07	458.50	458.86	458.41	458.65	459.70	459.46	
POOL CONTENT-EOM (1000AC. FT)	512.76	508.45	525.69	536.97	536.52	461.80	524.83	534.71	517.93	519.22	521.38	516.20	

W. D. MAYO LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1943 THRU 1981	1286.93	1308.95	1072.34	1000.13	1200.22	2018.50	2575.19	3157.14	2710.16	2122.46	974.74	1253.55	20680.3
FY 1990	1063.14	643.83	258.25	1197.02	2200.86	7847.80	7910.08	10331.70	4551.87	952.56	518.08	457.98	37933.2
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	1731.72	1557.84	1493.46	1415.00	1503.73	3336.07	3509.06	3211.44	3075.89	1604.83	731.96	745.51	23916.5
FY 1990	1062.87	642.75	258.08	1196.67	2201.31	7842.21	7907.32	10336.61	4552.73	951.45	516.36	458.20	37926.5
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.39	3.32	2.71	2.24	2.80	3.65	4.46	5.53	4.32	3.16	2.99	4.09	42.66
FY 1990	1.08	0.86	1.21	5.55	6.16	7.89	14.90	13.47	0.62	1.78	4.82	3.94	62.28
DEVIATION	-2.31	-2.46	-1.50	3.31	3.36	4.24	10.44	7.94	-3.70	-1.38	1.83	-0.15	19.62
POOL ELEVATION													
END OF MONTH	412.44	412.71	412.73	412.76	412.32	415.32	416.53	413.43	412.32	412.44	413.02	412.54	
MAXIMUM	413.08	413.06	413.29	413.09	413.05	420.30	418.72	427.50	414.30	413.13	413.74	413.13	
MINIMUM	412.14	412.02	412.02	411.93	411.59	411.18	411.50	409.27	408.74	411.86	412.00	412.20	
POOL CONTENT-EOM (1000AC. FT)	14.88	15.31	15.34	15.39	14.69	19.72	21.98	16.46	14.69	14.88	15.80	15.04	

ARKANSAS RIVER BASIN

WISTER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1938 THRU 1981	18.76	50.47	65.96	67.53	93.38	126.43	132.44	134.46	60.21	21.41	9.21	17.46	797.7
FY 1990	0.95	0.52	1.73	127.45	248.62	260.23	278.39	632.63	16.19	12.73	9.81	31.32	1620.6
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	15.40	35.72	97.74	83.07	94.50	122.24	101.04	129.18	113.27	18.04	6.85	5.92	823.0
FY 1990	1.17	1.13	1.17	99.49	234.66	104.50	250.29	491.48	318.43	16.34	16.73	29.37	1564.7
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.43	3.56	3.15	2.71	3.16	4.00	4.65	5.87	4.08	3.55	3.28	4.16	45.60
FY 1990	1.34	0.48	1.35	6.34	7.06	6.75	10.19	16.42	1.93	5.07	3.87	7.83	68.63
DEVIATION	-2.09	-3.08	-1.80	3.63	3.90	2.75	5.54	10.55	-2.15	1.52	0.59	3.67	23.03
POOL ELEVATION													
END OF MONTH	474.43	474.12	474.11	477.84	479.28	492.10	493.60	500.51	477.06	476.14	474.67	474.69	
MAXIMUM	474.70	474.48	474.13	487.07	488.80	492.58	494.06	508.22	500.51	479.51	476.14	477.18	
MINIMUM	474.38	474.12	474.01	474.10	477.84	475.98	479.66	493.40	477.06	474.49	474.60	474.49	
POOL CONTENT-EOM													
(1000AC. FT)	40.21	38.57	38.51	61.24	72.29	225.62	250.34	383.52	55.78	49.91	41.49	41.59	

JAMES W. TRIMBLE L & D	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1971 THRU 1990	1834.0	2278.8	2073.7	1816.7	1935.7	3850.2	3759.5	3626.1	3425.1	1573.4	732.8	841.0	27746.9
WY 1990	1030.0	615.5	235.8	1339.0	2745.2	8515.6	9003.6	11620.5	5087.2	1004.0	632.4	557.4	42386.1
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.8	4.4	3.0	2.1	3.6	4.5	3.8	5.9	3.3	3.5	2.8	2.7	43.3
WY 1990	.5	.2	.7	4.1	7.9	6.8	12.3	13.6	.7	3.7	6.9	5.7	63.2
DEVIATION	-3.2	-4.2	-2.4	2.0	4.3	2.4	8.5	7.7	-2.6	.2	4.2	3.0	19.8
POOL ELEVATION													
END OF MONTH	391.66	392.24	392.36	391.60	390.75	390.03	391.18	389.63	391.99	392.10	392.02	392.21	
MAXIMUM	392.45	392.55	392.52	392.62	392.08	394.50	393.47	402.74	392.22	392.55	392.58	392.52	
MINIMUM	391.19	391.51	391.98	390.31	389.86	389.00	389.15	388.89	389.03	391.76	391.15	391.52	
POOL CONTENT EOM													
(1,000 AC. FT.)	56.9	60.8	61.6	56.5	51.0	46.6	53.7	44.4	59.0	59.8	59.2	60.6	

ARKANSAS RIVER BASIN

OZARK-JETA TAYLOR LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1972 THRU 1990	1877.6	2513.2	2386.9	1940.0	2158.5	4282.5	4189.8	3934.1	3628.3	1646.4	786.2	874.8	30218.5
WY 1990	1039.7	628.6	235.9	1474.7	3086.4	8756.1	9182.3	11875.2	5283.1	973.6	553.4	523.1	43612.1
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.8	4.6	3.7	2.2	3.4	4.1	3.1	6.3	3.8	3.4	2.4	2.7	43.3
WY 1990	.4	.8	.8	6.0	4.8	5.9	6.1	11.3	1.9	2.9	1.9	1.3	44.1
DEVIATION	-3.3	-3.8	-2.9	3.8	1.3	1.8	3.0	5.0	-1.9	-.4	-.5	-1.4	.7
POOL ELEVATION													
END OF MONTH	371.79	371.27	372.00	371.83	371.23	371.38	371.72	371.71	372.23	371.92	371.98	372.18	
MAXIMUM	372.52	372.32	372.29	372.22	372.12	371.93	371.95	372.05	372.23	372.52	372.24	372.36	
MINIMUM	370.86	370.76	371.08	371.04	370.50	371.04	371.42	371.27	371.49	371.64	371.24	370.95	
POOL CONTENT EOM													
(1,000 AC. FT.)	146.4	141.3	148.4	146.8	140.9	142.4	145.7	145.6	151.1	147.6	148.2	150.5	

DARDANELLE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1966 THRU 1990	1520.3	2029.3	1961.0	1634.4	1791.9	3425.4	3313.1	3134.8	2969.8	1329.7	635.6	750.4	24495.9
WY 1990	1002.4	626.2	221.9	1614.2	3257.1	8864.0	9012.3	12664.7	5268.9	989.1	518.0	486.5	44525.3
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	4.0	4.7	3.9	2.3	3.6	4.4	4.0	6.7	3.1	2.6	2.3	2.7	44.4
WY 1990	.4	.6	.7	6.3	5.8	8.4	7.1	13.2	.8	1.5	.3	2.9	48.0
DEVIATION	-3.6	-4.1	-3.2	4.0	2.2	4.0	3.2	6.5	-2.3	-1.1	-2.0	.1	3.7
POOL ELEVATION													
END OF MONTH	337.65	337.57	337.89	338.10	337.89	337.55	337.43	337.57	337.81	338.03	337.62	337.51	
MAXIMUM	338.07	337.99	337.97	338.30	338.10	338.13	338.12	338.36	338.20	338.10	338.03	338.33	
MINIMUM	336.61	337.11	337.26	337.21	336.90	337.05	337.25	336.94	337.51	337.53	337.32	337.38	
POOL CONTENT EOM													
(1,000 AC. FT.)	474.5	471.8	482.5	489.7	482.5	471.1	467.1	471.8	479.8	487.3	473.5	469.8	

ARKANSAS RIVER BASIN

BLUE MOUNTAIN LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1948 THRU 1990	11.1	24.1	27.3	36.8	50.1	64.8	57.2	60.1	17.0	10.2	4.7	4.5	368.0
WY 1990	.0	.0	.6	42.6	93.0	125.1	164.2	270.3	20.6	9.1	.9	3.4	729.8
RELEASES (1,000 AC. FT.)													
AVG 1948 THRU 1990	5.4	14.1	35.1	39.8	45.2	50.5	47.3	53.1	39.0	18.8	10.6	6.1	365.0
WY 1990	.5	.3	.3	36.4	95.9	62.9	87.7	195.9	126.3	91.0	2.8	5.2	705.2
BASIN RAINFALL (INCHES)													
AVG 1978 THRU 1990	4.0	4.8	3.9	2.5	3.7	4.2	4.0	7.1	3.5	3.6	2.8	3.2	47.3
WY 1990	.7	.7	1.3	6.6	5.7	8.0	8.3	15.1	1.2	2.2	3.0	6.3	58.9
DEVIATION	-3.3	-4.2	-2.6	4.2	2.0	3.8	4.3	7.9	-2.2	-1.4	.2	3.1	11.6
POOL ELEVATION													
END OF MONTH	383.65	383.43	383.43	385.41	384.31	398.81	409.15	416.65	403.17	385.99	385.05	384.21	
MAXIMUM	384.01	383.65	383.47	393.29	396.91	401.11	409.43	425.19	416.65	403.17	385.99	385.17	
MINIMUM	383.61	383.37	383.33	383.37	383.99	384.79	392.65	409.07	403.17	385.99	385.05	384.21	
POOL CONTENT EOM (1,000 AC. FT.)	23.7	23.1	23.1	29.0	25.6	86.6	161.8	232.8	114.7	30.7	27.9	25.3	

ARTHUR V. ORMOND L & D	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1970 THRU 1990	1841.7	2542.7	2596.2	2149.5	2318.0	4350.1	4261.9	4175.3	3670.7	1624.0	775.3	909.0	31214.4
WY 1990	773.4	510.1	207.3	1644.7	3652.5	9175.0	9689.6	13774.2	5609.3	1068.4	478.9	489.1	47072.5
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.7	5.3	4.2	2.2	3.7	4.0	3.8	5.6	3.6	2.6	2.5	2.7	43.7
WY 1990	.9	1.0	.8	4.4	6.4	7.9	4.6	8.5	2.6	.5	1.1	4.0	42.5
DEVIATION	-2.8	-4.2	-3.4	2.1	2.7	3.9	.8	2.9	-1.0	-2.1	-1.4	1.3	-1.2
POOL ELEVATION													
END OF MONTH	285.37	286.11	285.86	284.61	284.26	287.06	287.55	285.29	285.40	286.55	287.10	284.93	
MAXIMUM	287.39	287.26	287.05	286.94	286.98	291.09	291.79	301.48	286.27	287.53	287.44	287.51	
MINIMUM	284.16	284.21	284.10	284.28	284.26	284.05	284.21	284.07	284.16	285.07	284.70	284.22	
POOL CONTENT EOM (1,000 AC. FT.)	55.8	59.7	58.4	51.9	50.1	64.9	67.8	55.4	56.0	62.1	65.2	53.5	

ARKANSAS RIVER BASIN

TOAD SUCK FERRY L & D	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1970 THRU 1990	1832.3	2595.9	2728.9	2216.6	2416.4	4391.2	4308.2	4006.1	3736.0	1638.2	778.7	916.9	31565.3
WY 1990	754.6	533.2	221.1	1621.9	3743.5	9523.0	9992.1	14142.2	5714.8	1038.6	504.5	476.4	48265.8
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.8	5.5	4.4	2.3	3.5	3.9	4.4	5.5	3.5	2.4	2.8	2.8	44.8
WY 1990	.8	1.1	1.0	4.0	5.4	7.7	3.5	7.4	2.5	.9	1.8	4.6	40.8
DEVIATION	-2.9	-4.4	-3.4	1.7	1.8	3.8	-.8	1.8	-1.0	-1.5	-1.0	1.9	-4.0
POOL ELEVATION													
END OF MONTH	265.13	265.12	265.25	265.43	264.49	271.83	272.23	269.89	265.09	265.43	265.32	265.23	
MAXIMUM	265.47	265.63	265.63	266.24	270.31	274.68	275.34	283.14	269.89	265.89	265.65	265.57	
MINIMUM	264.83	264.90	264.89	264.39	264.12	264.32	266.60	269.12	264.17	264.92	264.84	264.76	
POOL CONTENT EOM													
(1,000 AC. FT.)	33.6	33.5	34.1	34.8	31.0	84.3	88.6	65.5	33.4	34.8	34.4	34.0	

NIMROD LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1944 THRU 1990	17.8	38.9	68.5	65.5	85.1	120.1	95.0	100.1	37.8	12.7	4.8	7.1	653.5
WY 1990	.1	.1	1.1	67.1	119.7	156.1	167.2	406.2	37.3	.1	.1	2.7	957.6
RELEASES (1,000 AC. FT.)													
AVG 1944 THRU 1990	6.6	24.1	51.8	56.3	85.5	99.8	80.5	90.9	50.4	20.8	9.3	6.8	582.8
WY 1990	.7	.3	.3	63.4	118.8	58.4	61.0	304.0	253.3	56.9	1.5	4.3	922.8
BASIN RAINFALL (INCHES)													
AVG 1978 THRU 1990	4.2	5.1	4.3	2.6	3.8	4.6	4.3	7.5	4.0	3.7	2.8	3.4	50.5
WY 1990	1.0	.8	1.5	6.7	5.2	7.1	6.8	16.0	1.0	3.3	1.9	5.8	56.9
DEVIATION	-3.3	-4.3	-2.9	4.1	1.4	2.5	2.5	8.5	-3.0	-.5	-.9	2.3	6.4
POOL ELEVATION													
END OF MONTH	341.56	341.36	341.48	342.41	342.52	357.54	366.58	372.61	353.74	343.76	342.78	342.08	
MAXIMUM	342.08	341.56	341.52	352.50	354.14	357.88	366.58	377.90	372.61	353.74	343.76	342.78	
MINIMUM	341.55	341.34	341.28	341.46	342.38	342.76	356.16	366.64	353.74	343.76	342.78	342.08	
POOL CONTENT EOM													
(1,000 AC. FT.)	27.4	26.7	27.2	30.5	30.9	127.5	231.5	329.0	95.1	35.8	31.8	29.3	

ARKANSAS RIVER BASIN

MURRAY LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1970 THRU 1990	1910.0	2679.7	2895.9	2446.9	2605.7	4645.3	4723.0	4529.0	3820.0	1635.5	739.6	900.8	33531.3
WY 1990	995.0	613.3	220.4	1848.0	4047.4	9310.3	9668.9	14414.9	5616.7	1121.1	498.8	520.5	48875.2
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.1	6.1	4.3	2.7	3.8	4.7	4.5	5.8	2.9	2.9	2.2	2.8	45.7
WY 1990	1.7	1.7	1.5	6.1	5.2	12.9	5.8	9.0	.9	2.5	3.0	3.3	53.7
DEVIATION	-1.4	-4.4	-2.7	3.5	1.4	8.2	1.3	3.2	-2.0	-.4	.8	.5	8.0
POOL ELEVATION													
END OF MONTH	249.24	249.17	249.18	248.78	248.53	247.27	247.50	247.55	249.26	249.54	249.21	249.23	
MAXIMUM	249.31	249.35	249.41	249.44	248.90	248.53	247.85	258.61	249.26	250.35	249.76	249.42	
MINIMUM	248.80	248.89	248.98	248.00	247.08	246.88	247.11	247.00	247.32	248.92	249.13	248.88	
POOL CONTENT EOM													
(1,000 AC. FT.)	89.6	88.9	89.0	85.1	82.8	71.9	73.8	74.2	89.8	92.7	89.3	89.5	

DAVID D. TERRY L & D	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1969 THRU 1990	1899.8	2669.2	3030.9	2536.2	2748.9	4689.6	4788.8	4635.8	3880.8	1724.7	779.9	910.3	34294.9
WY 1990	938.7	602.5	220.5	1711.3	3960.5	9404.8	9767.1	14844.7	5615.6	1019.7	512.8	510.8	49109.0
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.5	4.9	3.9	2.7	3.1	4.1	4.5	5.4	2.6	2.7	2.1	2.7	42.3
WY 1990	1.6	1.4	.6	4.9	4.7	9.3	6.0	5.3	.4	2.1	1.7	1.2	39.5
DEVIATION	-1.8	-3.5	-3.3	2.2	1.6	5.2	1.5	-.0	-2.2	-.6	-.4	-1.4	-2.8
POOL ELEVATION													
END OF MONTH	231.30	231.34	231.09	230.15	230.31	230.99	231.41	230.07	231.12	231.41	230.92	231.23	
MAXIMUM	231.44	231.53	231.41	231.43	230.93	233.61	234.23	243.00	231.12	231.54	231.52	231.47	
MINIMUM	230.80	231.08	230.76	229.77	229.69	229.10	229.04	229.33	228.91	230.91	230.75	230.90	
POOL CONTENT EOM													
(1,000 AC. FT.)	50.9	51.1	49.9	46.3	46.9	49.5	51.4	46.0	50.1	51.4	49.2	50.6	

ARKANSAS RIVER BASIN

LOCK AND DAM NO. 5	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1970 THRU 1990	1993.4	2722.8	2961.0	2502.0	2685.4	4707.5	4852.4	4688.7	3925.4	1712.1	789.7	949.7	34490.2
WY 1990	980.1	669.5	212.9	1935.8	4298.1	10027.7	10640.3	16126.5	6134.5	1179.9	530.2	560.6	53295.9
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.9	4.7	4.6	2.8	3.6	4.0	4.7	5.8	3.0	3.2	2.9	3.4	46.6
WY 1990	.8	1.8	.6	5.2	5.4	8.2	5.4	6.2	1.5	3.9	1.4	1.2	41.8
DEVIATION	-3.1	-2.8	-4.0	2.4	1.9	4.2	.7	.4	-1.5	.7	-1.5	-2.2	-4.8
POOL ELEVATION													
END OF MONTH	213.00	213.29	213.21	213.03	212.24	212.33	213.06	211.89	213.33	213.18	213.62	213.32	
MAXIMUM	213.44	213.41	213.47	213.41	213.08	214.78	215.56	223.35	213.33	213.48	213.77	213.80	
MINIMUM	212.76	212.96	213.02	211.40	211.51	210.90	211.04	211.13	211.31	212.99	212.88	213.08	
POOL CONTENT EOM													
(1,000 AC. FT.)	61.3	63.4	62.8	61.5	56.4	57.0	61.7	54.3	63.7	62.6	65.8	63.6	

LOCK AND DAM NO. 4	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1970 THRU 1990	2009.1	2776.2	3018.8	2560.7	2756.2	4865.4	5094.4	4889.8	4073.3	1731.0	780.9	946.6	35502.4
WY 1990	1069.7	669.7	199.8	2051.0	4442.0	10492.1	11414.9	16884.9	6735.3	1183.3	558.0	568.1	56269.0
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.7	6.0	5.4	3.3	4.5	4.5	4.4	5.5	3.5	3.5	2.5	3.2	50.0
WY 1990	.4	2.1	1.6	4.8	6.4	8.6	6.7	5.9	1.6	2.8	1.3	2.3	44.6
DEVIATION	-3.2	-3.9	-3.8	1.5	1.9	4.2	2.3	.4	-1.9	-.6	-1.2	-.9	-5.4
POOL ELEVATION													
END OF MONTH	196.10	196.25	196.27	195.36	195.55	196.97	197.80	196.17	195.88	196.12	196.25	196.19	
MAXIMUM	196.42	196.45	196.56	196.48	196.07	198.71	200.12	205.76	196.17	196.41	196.56	196.57	
MINIMUM	195.87	195.86	195.91	195.19	194.88	194.54	194.35	195.69	194.03	195.90	196.00	196.10	
POOL CONTENT EOM													
(1,000 AC. FT.)	71.1	72.0	72.2	66.9	68.0	76.8	81.9	71.5	69.8	71.2	72.0	71.7	

ARKANSAS RIVER BASIN

LOCK AND DAM NO. 3	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1970 THRU 1990	2012.3	2802.5	3079.3	2569.7	2787.8	4910.3	5184.8	5008.0	4176.9	1744.6	770.3	929.2	35975.8
WY 1990	898.9	625.5	207.0	1919.1	4476.1	10374.2	11566.2	17099.5	7299.9	1203.4	530.0	531.4	56731.3
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	3.9	5.8	4.7	3.4	4.1	4.5	4.2	5.4	3.4	2.7	2.1	2.9	47.1
WY 1990	.8	5.5	2.3	4.9	7.0	10.2	5.9	5.3	2.6	2.2	.6	.9	48.3
DEVIATION	-3.1	-.3	-2.5	1.5	2.9	5.6	1.7	-.2	-.7	-.5	-1.6	-1.9	1.1
POOL ELEVATION													
END OF MONTH	182.02	182.22	182.26	181.28	181.35	184.80	185.24	184.16	181.78	182.26	182.19	182.20	
MAXIMUM	182.49	182.45	182.37	182.53	182.27	186.09	187.03	193.90	184.16	182.62	182.54	182.49	
MINIMUM	181.72	181.79	181.94	181.28	181.10	180.90	181.21	183.77	180.55	181.68	181.72	181.67	
POOL CONTENT EOM													
(1,000 AC. FT.)	46.5	47.3	47.4	43.6	43.9	58.8	61.1	55.8	45.5	47.4	47.2	47.2	

WILBUR D. MILLS DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RELEASES (1,000 AC. FT.)													
AVG 1970 THRU 1990	1917.1	2834.8	3262.7	2685.0	2886.9	5054.8	5337.0	5080.3	4161.7	1741.9	765.6	946.0	36673.7
WY 1990	840.6	604.3	202.6	1884.2	4825.7	10546.8	11581.0	16809.5	7332.6	1210.4	540.4	586.5	56964.6
PROJECT RAINFALL (INCHES)													
AVG 1978 THRU 1990	4.7	6.1	5.2	4.0	4.9	5.3	4.2	5.1	3.4	3.6	2.6	3.5	52.7
WY 1990	1.5	5.5	2.1	5.8	10.7	10.3	4.1	5.1	4.2	1.7	.6	2.8	54.4
DEVIATION	-3.2	-.5	-3.1	1.9	5.7	5.0	-.2	-.0	.8	-1.9	-2.0	-.7	1.7
POOL ELEVATION													
END OF MONTH	162.09	162.22	162.25	161.77	161.78	161.65	160.76	161.00	161.93	162.16	162.33	162.19	
MAXIMUM	162.47	162.37	162.48	162.50	162.01	162.06	161.65	162.50	162.04	163.68	162.36	162.44	
MINIMUM	162.02	162.00	162.00	161.49	161.00	160.52	160.36	157.81	160.58	161.84	162.02	162.08	
POOL CONTENT EOM													
(1,000 AC. FT.)	111.1	112.5	112.9	107.6	107.7	106.4	97.1	99.4	109.4	111.9	113.8	112.2	

NORREL LOCK NO. 1 (No basic data collected)

RED RIVER BASIN

ALTUS LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1938 THRU 1981	7.13	2.75	3.44	3.77	5.05	5.93	9.57	29.65	20.95	8.39	3.01	3.01	102.7
FY 1990	4.60	3.06	4.02	11.16	10.46	16.45	16.56	37.19	24.05	1.22	0.76	2.03	131.6
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	0.19	2.77	1.26	1.60	2.42	5.13	3.13	17.07	11.20	6.78	4.55	0.33	56.4
FY 1990	0.00	0.00	0.00	0.00	0.00	2.60	13.16	22.36	30.54	0.00	0.00	0.00	68.7
RAINFALL(INCHES)													
AVG 1930 THRU 1980	1.99	0.88	0.77	0.63	0.83	1.19	1.99	4.09	3.19	2.21	2.50	2.30	22.57
FY 1990	0.94	0.00	0.14	1.10	2.32	3.56	6.73	4.86	1.66	1.93	2.89	3.46	29.59
DEVIATION	-1.05	-0.88	-0.63	0.47	1.49	2.37	4.74	0.77	-1.53	-0.28	0.39	1.16	7.02
POOL ELEVATION													
END OF MONTH	1552.76	1553.10	1553.68	1555.57	1557.20	1559.10	1559.16	1560.93	1557.08	1552.66	1549.48	1548.34	
MAXIMUM	1552.80	1553.10	1553.68	1555.57	1557.20	1559.21	1559.21	1560.93	1561.15	1557.08	1552.66	1549.48	
MINIMUM	1552.32	1552.75	1553.10	1553.68	1555.57	1557.20	1559.02	1558.99	1557.08	1552.59	1549.48	1548.08	
POOL CONTENT-EOM (1000AC. FT)	97.32	99.07	102.12	112.45	121.87	133.47	133.85	145.26	121.15	96.81	81.48	76.40	

MOUNTAIN PARK DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1926 THRU 1981	1.51	0.45	0.36	0.25	0.33	0.66	1.38	5.73	4.07	1.28	0.73	1.77	18.5
FY 1990	0.36	0.03	0.03	1.14	3.49	12.48	8.27	14.51	0.95	2.84	1.88	0.18	46.2
RELEASES(1000AC. FT.)													
AVG 1981 THRU 1990	0.91	2.14	0.56	0.00	1.10	1.50	0.40	3.67	3.24	0.53	0.00	0.00	14.0
FY 1990	0.00	0.00	0.00	0.00	0.00	0.00	1.88	12.03	0.00	0.00	0.00	0.00	13.9
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.49	1.35	1.14	1.03	1.18	1.55	2.43	4.82	3.37	2.15	2.26	2.87	26.64
FY 1990	2.63	0.11	0.10	1.99	3.58	7.42	5.97	4.45	2.13	5.28	2.89	1.92	38.47
DEVIATION	0.14	-1.24	-1.04	0.96	2.40	5.87	3.54	-0.37	-1.24	3.13	0.63	-0.95	11.83
POOL ELEVATION													
END OF MONTH	1409.21	1408.70	1408.40	1408.35	1408.67	1410.50	1411.13	1410.95	1410.31	1410.15	1409.89	1409.42	
MAXIMUM	1409.61	1409.22	1408.70	1408.50	1408.67	1410.54	1411.30	1412.70	1411.00	1410.31	1410.16	1409.89	
MINIMUM	1409.04	1408.70	1408.39	1408.32	1408.26	1408.67	1410.36	1410.82	1410.31	1409.66	1409.77	1409.42	
POOL CONTENT-EOM (1000AC. FT)	78.03	75.09	73.38	73.09	74.92	85.84	89.82	88.66	84.64	83.64	82.05	79.27	

RED RIVER BASIN

LAKE KEMP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1924 THRU 1981	22.20	5.94	6.74	3.73	5.59	7.68	12.78	38.02	25.28	15.57	18.91	27.01	189.4
FY 1990	3.71	1.51	0.08	8.21	12.48	36.09	74.57	37.04	78.20	20.38	8.97	9.12	290.4
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	7.35	7.27	2.28	2.12	1.45	6.32	5.55	9.26	15.94	15.19	12.59	11.05	96.4
FY 1990	6.79	0.00	4.36	0.33	0.00	26.11	25.81	70.94	60.55	10.75	8.67	8.04	222.4
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.41	1.08	0.98	0.83	1.00	1.10	1.88	3.66	2.73	1.99	2.22	2.92	22.80
FY 1990	0.57	0.05	0.38	1.68	2.83	6.96	8.22	2.94	3.57	3.83	1.87	1.74	34.64
DEVIATION	-1.84	-1.03	-0.60	0.85	1.83	5.86	6.34	-0.72	0.84	1.84	-0.35	-1.18	11.84
POOL ELEVATION													
END OF MONTH	1143.53	1143.30	1142.85	1143.23	1143.86	1144.19	1146.74	1144.10	1144.28	1144.20	1143.56	1143.18	
MAXIMUM	1144.23	1143.55	1143.32	1143.32	1143.86	1145.22	1147.84	1147.58	1147.87	1144.28	1144.42	1143.59	
MINIMUM	1143.47	1143.30	1142.82	1142.83	1143.21	1143.86	1144.00	1143.90	1144.10	1143.45	1143.56	1142.76	
POOL CONTENT-EOM													
(1000AC. FT)	260.85	257.36	250.61	256.30	265.87	271.02	313.23	269.59	272.45	271.18	261.31	255.54	

WAURIKA LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1925 THRU 1981	7.81	4.14	3.26	1.71	3.76	5.22	7.51	26.25	17.73	3.32	1.70	4.28	86.7
FY 1990	1.66	0.35	0.98	4.00	10.99	58.67	107.22	91.44	10.12	9.49	4.59	1.52	301.0
RELEASES(1000AC. FT.)													
AVG 1983 THRU 1990	13.05	18.29	6.54	12.08	6.71	32.63	17.90	27.05	37.20	9.47	0.19	2.78	183.9
FY 1990	0.13	0.00	0.00	0.00	0.00	59.43	33.86	136.67	23.48	0.25	0.25	0.24	254.3
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.92	1.79	1.47	1.30	1.47	1.94	2.75	5.21	3.61	2.31	2.36	3.26	30.39
FY 1990	1.45	0.04	0.23	2.16	3.78	6.02	9.25	5.55	2.05	4.55	3.51	2.82	41.41
DEVIATION	-1.47	-1.75	-1.24	0.86	2.31	4.08	6.50	0.34	-1.56	2.24	1.15	-0.44	11.02
POOL ELEVATION													
END OF MONTH	951.17	950.93	950.83	951.00	951.82	951.49	957.38	953.09	951.11	951.33	951.16	950.88	
MAXIMUM	951.51	951.33	951.10	951.15	951.82	955.20	957.75	962.47	953.11	951.60	951.55	951.16	
MINIMUM	951.00	950.82	950.74	950.68	951.00	951.49	951.37	953.09	951.11	950.79	951.16	950.88	
POOL CONTENT-EOM													
(1000AC. FT)	200.67	198.17	197.13	198.90	207.43	204.00	272.59	221.41	200.04	202.33	200.56	197.65	

RED RIVER BASIN

FOSS RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1926 THRU 1980	3.53	1.79	1.23	1.31	1.79	2.86	9.34	15.36	12.37	3.69	3.11	2.87	59.3
FY 1990	1.80	1.95	5.48	5.75	6.67	6.33	13.23	16.48	12.93	2.94	7.44	3.77	84.8
RELEASES(1000AC. FT.)													
AVG 1978 THRU 1990	1.26	0.90	0.53	1.72	1.51	2.29	2.98	4.25	9.01	5.43	1.92	1.26	33.1
FY 1990	0.61	0.59	0.61	0.61	0.55	4.12	7.47	6.40	15.36	2.58	1.81	0.59	41.3
RAINFALL(INCHES)													
AVG 1930 THRU 1980	1.60	0.94	0.67	0.57	0.80	1.13	1.73	3.66	3.06	2.44	2.45	1.82	20.87
FY 1990	0.85	0.00	0.21	1.89	2.70	4.06	7.46	5.30	3.10	1.28	3.18	3.45	33.48
DEVIATION	-0.75	-0.94	-0.46	1.32	1.90	2.93	5.73	1.64	0.04	-1.16	0.73	1.63	12.61
POOL ELEVATION													
END OF MONTH	1639.89	1639.85	1640.42	1641.01	1641.70	1641.79	1642.29	1643.18	1642.10	1641.47	1641.68	1641.74	
MAXIMUM	1640.05	1639.99	1640.42	1641.04	1641.70	1642.08	1642.36	1643.18	1643.48	1642.10	1642.10	1641.78	
MINIMUM	1639.85	1639.78	1639.84	1640.42	1641.01	1641.70	1641.40	1641.90	1642.10	1641.47	1641.46	1641.55	
POOL CONTENT-EOM (1000AC. FT)	164.04	163.79	167.46	171.29	175.89	176.50	179.90	186.08	178.59	174.36	175.76	176.16	

FORT COBB RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1926 THRU 1981	2.94	1.88	2.05	2.27	2.38	3.09	4.10	6.26	5.89	2.86	1.85	2.41	38.0
FY 1990	4.73	2.42	2.37	4.71	6.95	22.84	6.62	18.46	3.15	1.88	4.24	2.40	80.8
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	1.65	2.22	0.24	1.01	0.82	2.56	0.99	1.28	8.23	1.67	0.12	0.45	21.2
FY 1990	1.45	0.00	0.00	4.40	3.72	18.86	7.88	5.36	8.71	0.00	0.00	0.00	50.4
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.37	1.39	1.18	1.00	1.12	1.62	2.64	4.78	3.67	2.28	2.47	3.07	27.59
FY 1990	4.06	0.03	1.71	1.94	4.65	7.97	4.96	6.98	1.70	3.15	3.86	4.21	45.22
DEVIATION	1.69	-1.36	0.53	0.94	3.53	6.35	2.32	2.20	-1.97	0.87	1.39	1.14	17.63
POOL ELEVATION													
END OF MONTH	1342.10	1342.21	1342.38	1342.00	1342.30	1342.75	1341.98	1344.40	1342.20	1341.77	1342.02	1341.93	
MAXIMUM	1342.48	1342.23	1342.38	1342.94	1342.67	1346.11	1342.75	1344.40	1344.68	1342.20	1342.28	1342.02	
MINIMUM	1341.91	1342.01	1342.21	1342.00	1341.99	1342.06	1341.98	1341.97	1342.20	1341.67	1341.76	1341.68	
POOL CONTENT-EOM (1000AC. FT)	80.43	80.88	81.59	80.01	81.26	83.13	79.93	90.24	80.84	79.08	80.09	79.73	

RED RIVER BASIN

ARBUCKLE RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1926 THRU 1981	3.80	3.24	3.29	3.07	4.90	5.63	8.07	12.49	7.59	2.94	2.12	3.74	60.9
FY 1990	1.31	0.67	0.53	9.14	8.88	38.28	57.07	47.70	5.07	1.12	2.04	14.88	186.7
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	1.24	0.61	2.94	2.94	2.92	6.93	6.54	12.96	8.58	0.48	0.29	1.51	47.9
FY 1990	0.06	0.06	0.06	4.86	6.99	36.37	30.80	70.86	3.55	0.54	1.55	13.39	169.1
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.48	2.33	2.06	1.75	2.21	2.92	3.86	5.65	3.90	2.48	2.78	3.75	37.17
FY 1990	1.15	1.36	0.49	3.46	2.85	8.25	12.17	7.64	4.11	2.69	1.92	7.43	53.52
DEVIATION	-2.33	-0.97	-1.57	1.71	0.64	5.33	8.31	1.99	0.21	0.21	-0.86	3.68	16.35
POOL ELEVATION													
END OF MONTH	871.62	871.25	870.83	872.04	872.29	872.48	881.79	872.64	872.60	872.27	871.92	872.08	
MAXIMUM	871.84	871.64	871.25	873.48	872.67	878.87	884.47	889.00	872.73	872.60	872.60	874.87	
MINIMUM	871.51	871.25	870.82	870.75	871.99	871.98	871.91	872.00	871.97	872.26	871.92	871.73	
POOL CONTENT-EOM (1000AC. FT)	71.52	70.66	69.69	72.49	73.09	73.54	98.23	73.92	73.83	73.04	72.21	72.59	

LAKE TEXOMA	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1906 THRU 1981	366.34	199.55	180.83	140.89	166.47	227.04	413.04	812.92	688.44	214.49	177.99	240.90	3828.9
FY 1990	111.93	96.99	46.33	281.55	221.55	1985.06	3101.75	3093.94	546.33	152.83	149.45	194.28	9982.0
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	334.62	273.89	173.19	230.92	184.69	396.03	356.53	598.00	991.06	397.82	161.44	129.11	4227.3
FY 1990	207.82	105.30	101.74	132.70	252.48	1094.76	1459.97	3860.78	1788.29	224.73	254.11	116.85	9599.5
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.49	1.39	1.22	1.13	1.28	1.64	2.48	4.39	3.30	2.20	2.33	2.89	26.74
FY 1990	1.71	0.14	0.34	2.28	3.40	5.83	7.73	4.49	2.48	3.60	2.97	3.20	38.17
DEVIATION	-0.78	-1.25	-0.88	1.15	2.12	4.19	5.25	0.10	-0.82	1.40	0.64	0.31	11.43
POOL ELEVATION													
END OF MONTH	615.83	615.43	614.58	616.19	615.61	624.65	637.78	631.44	619.37	617.95	616.25	616.76	
MAXIMUM	617.34	615.97	615.43	616.75	616.57	626.64	637.78	6[illegible].76	631.44	619.37	617.95	616.85	
MINIMUM	615.72	615.43	614.34	614.58	615.30	615.60	618.02	631.44	619.37	617.95	616.25	615.68	
POOL CONTENT-EOM (1000AC. FT)	2543.20	2511.20	2444.04	2573.23	2525.60	3392.06	4998.96	4170.82	2860.57	2728.80	2578.42	2622.54	

RED RIVER BASIN

MCGEE CREEK	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1938 THRU 1976	5.37	6.61	5.69	4.84	10.14	11.89	18.50	17.98	10.32	4.03	1.97	4.72	102.1
FY 1990	0.12	0.04	0.00	24.43	35.90	54.94	84.78	92.16	8.05	0.70	0.59	7.51	309.2
RELEASES(1000AC. FT.)													
AVG 1989 THRU 1990	0.68	0.62	0.67	11.68	33.50	31.62	21.32	56.08	43.91	2.17	0.68	6.40	209.4
FY 1990	0.68	0.65	0.68	17.43	35.01	40.03	28.40	94.68	55.41	3.70	0.68	8.28	285.6
RAINFALL(INCHES)													
AVG 1930 THRU 1980	2.38	1.72	1.18	2.17	3.05	3.38	5.02	6.08	4.44	3.45	2.99	4.46	40.32
FY 1990	1.03	0.51	0.65	7.32	6.57	9.53	15.41	12.36	1.93	1.72	2.00	12.93	71.96
DEVIATION	-1.35	-1.21	-0.53	5.15	3.52	6.15	10.39	6.28	-2.51	-1.73	-0.99	8.47	31.64
POOL ELEVATION													
END OF MONTH	175.70	175.55	175.38	175.93	175.97	177.07	180.68	179.86	176.48	176.14	176.02	175.88	
MAXIMUM	175.84	175.70	175.55	177.05	177.02	178.52	180.79	183.44	179.93	176.48	176.17	176.35	
MINIMUM	175.68	175.55	175.38	175.34	175.91	175.90	175.90	179.51	176.48	176.11	176.02	175.88	
POOL CONTENT-EOM													
(1000AC. FT)	111.52	109.70	107.64	114.31	114.80	129.19	184.70	170.90	121.42	116.99	115.42	113.70	

PAT MAYSE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1937 THRU 1981	4.89	7.23	7.99	6.38	11.78	12.30	16.04	15.77	10.14	3.64	1.49	4.15	101.8
FY 1990	0.12	0.36	0.01	24.81	36.10	46.33	36.16	60.20	20.00	0.18	0.42	1.09	225.8
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	0.27	2.54	5.44	4.24	9.04	14.16	11.86	13.67	15.46	5.42	0.70	0.14	82.9
FY 1990	0.40	0.00	0.00	8.59	33.81	31.17	42.09	53.12	28.99	0.97	0.00	0.00	199.1
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.55	3.39	3.21	2.76	3.09	3.74	4.71	5.30	4.01	3.28	2.62	4.19	43.85
FY 1990	1.72	0.96	0.57	6.75	5.91	8.94	8.50	10.73	2.77	3.20	1.49	3.97	55.51
DEVIATION	-1.83	-2.43	-2.64	3.99	2.82	5.20	3.79	5.43	-1.24	-0.08	-1.13	-0.22	11.66
POOL ELEVATION													
END OF MONTH	450.79	450.51	450.22	452.62	452.69	454.73	453.44	454.03	451.73	450.81	450.26	450.00	
MAXIMUM	451.30	450.79	450.51	453.55	456.24	455.08	455.10	459.63	455.84	451.73	450.81	450.26	
MINIMUM	450.73	450.51	450.22	450.17	452.62	452.30	453.39	453.35	451.73	450.81	450.26	449.99	
POOL CONTENT-EOM													
(1000AC. FT)	123.26	121.61	119.90	134.44	134.88	148.02	139.61	143.40	128.95	123.38	120.13	118.60	

RED RIVER BASIN

SARDIS LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1926 THRU 1981	**9.07**	**15.39**	**20.38**	**21.79**	**26.99**	**30.93**	**39.85**	**39.52**	**19.88**	**6.87**	**2.66**	**9.87**	**245.9**
FY 1990	0.28	0.30	0.23	54.91	82.77	84.63	120.71	206.96	8.29	28.03	27.04	17.65	631.8
RELEASES(1000AC. FT.)													
AVG 1985 THRU 1990	**6.99**	**35.68**	**26.66**	**26.08**	**35.28**	**43.55**	**31.15**	**58.12**	**44.72**	**2.80**	**5.87**	**4.01**	**320.9**
FY 1990	0.00	0.00	0.00	37.13	81.64	70.49	31.90	212.53	79.42	16.69	32.09	14.41	576.3
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.44	3.40	2.78	2.50	3.01	3.63	4.78	6.03	4.34	3.54	3.28	4.57	45.30
FY 1990	1.20	0.26	0.76	8.00	7.39	8.17	12.72	15.64	1.83	5.53	4.15	8.52	74.17
DEVIATION	-2.24	-3.14	-2.02	5.50	4.38	4.54	7.94	9.61	-2.51	1.99	0.87	3.95	28.87
POOL ELEVATION													
END OF MONTH	598.50	598.17	597.98	599.13	599.05	599.39	605.47	604.75	599.49	599.33	599.05	598.97	
MAXIMUM	598.32	598.50	598.17	601.55	601.28	602.32	605.35	612.14	604.75	600.63	600.87	600.00	
MINIMUM	598.47	598.17	597.92	597.97	599.04	599.04	599.01	604.75	599.49	598.98	599.05	598.88	
POOL CONTENT-EOM													
(1000AC. FT)	267.64	263.22	260.68	276.14	275.03	286.68	371.51	359.85	281.13	285.84	275.03	273.93	

HUGO LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1926 THRU 1964	40.79	74.01	117.34	160.37	177.57	171.23	257.85	250.16	114.02	56.90	19.14	49.05	1485.4
FY 1990	4.20	2.54	2.91	208.44	475.14	538.43	550.21	953.51	159.03	43.79	71.54	79.89	3089.7
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	48.59	100.55	117.94	118.50	190.74	216.08	219.92	253.56	181.30	56.75	28.57	20.89	1553.4
FY 1990	8.45	3.67	1.50	191.31	475.17	254.25	346.33	827.48	632.48	93.15	115.89	68.76	3018.5
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.65	3.75	3.19	2.85	3.27	3.92	5.03	6.09	4.24	3.54	3.31	4.55	47.39
FY 1990	1.15	0.33	0.93	7.19	7.60	9.35	13.13	14.61	2.43	5.16	3.86	8.00	73.74
DEVIATION	-2.50	-3.42	-2.26	4.34	4.33	5.43	8.10	8.52	-1.81	1.62	0.55	3.45	26.35
POOL ELEVATION													
END OF MONTH	403.93	403.63	403.64	404.78	404.60	419.68	427.11	430.97	411.17	407.76	404.22	404.75	
MAXIMUM	404.48	404.00	403.75	412.96	414.37	420.88	427.25	439.96	432.96	411.17	408.46	407.05	
MINIMUM	403.80	403.63	403.51	403.62	404.38	404.57	411.80	427.02	411.17	406.99	404.22	403.75	
POOL CONTENT-EOM													
(1000AC. FT)	149.93	146.21	146.34	161.33	158.90	439.45	637.27	752.87	260.39	204.02	153.77	160.93	

RED RIVER BASIN

PINE CREEK LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1929 THRU 1981	22.63	38.04	56.04	60.24	78.03	82.93	95.41	104.78	42.28	17.31	8.38	22.66	628.7
FY 1990	0.47	1.35	2.14	74.41	204.30	231.19	205.82	357.55	56.21	20.43	27.03	33.90	1234.8
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	21.79	49.62	61.96	55.39	80.92	97.57	87.49	99.86	82.30	15.14	11.12	13.61	676.8
FY 1990	3.88	3.87	4.00	6.57	202.29	192.91	172.57	224.03	238.87	13.09	39.45	41.47	1213.0
RAINFALL(INCHES)													
AVG 1930 THRU 1980	3.76	3.39	3.59	3.12	3.48	4.25	5.15	6.21	4.28	3.87	3.53	4.67	49.30
FY 1990	1.24	0.30	1.48	7.24	7.45	9.79	11.85	15.38	3.03	6.70	3.46	4.97	73.39
DEVIATION	-2.52	-3.59	-2.11	4.12	3.97	5.54	6.70	9.67	-1.25	2.83	-0.07	0.30	23.59
POOL ELEVATION													
END OF MONTH	436.08	435.15	434.45	439.35	439.64	447.14	452.00	465.76	442.56	443.60	440.50	438.32	
MAXIMUM	438.36	436.08	435.15	449.39	455.88	458.47	456.71	472.34	467.98	444.13	444.16	444.32	
MINIMUM	436.08	435.15	434.34	434.43	439.35	438.00	441.95	451.15	442.56	441.73	440.50	438.32	
POOL CONTENT-EOM (1000AC. FT)	46.92	43.89	41.71	59.03	60.21	97.49	129.38	259.33	73.14	78.22	63.83	54.99	

BROKEN BOW LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC. FT.)													
AVG 1930 THRU 1981	34.81	58.40	95.11	111.71	114.40	140.87	130.36	138.16	52.17	26.71	14.15	23.55	940.4
FY 1990	1.04	0.36	0.48	111.81	169.19	216.10	188.89	511.69	62.93	27.27	10.12	9.73	1309.6
RELEASES(1000AC. FT.)													
AVG 1976 THRU 1990	24.50	48.02	86.85	79.13	87.73	107.47	120.08	106.50	102.42	49.99	33.41	21.93	868.0
FY 1990	9.57	7.63	8.61	55.12	170.78	157.61	220.96	237.84	319.12	39.14	36.97	28.73	1292.1
RAINFALL(INCHES)													
AVG 1930 THRU 1980	4.14	4.08	4.15	3.72	3.83	4.89	5.28	6.29	4.31	4.23	3.69	4.60	53.21
FY 1990	1.72	0.75	2.77	6.25	4.45	7.40	9.17	18.49	2.83	7.60	3.16	5.59	70.18
DEVIATION	-2.42	-3.33	-1.38	2.53	0.62	2.51	3.89	12.20	-1.48	3.37	-0.53	0.99	16.97
POOL ELEVATION													
END OF MONTH	597.52	596.70	595.95	599.85	599.57	603.44	601.00	618.26	600.94	599.64	597.28	595.54	
MAXIMUM	598.45	597.53	596.70	602.33	607.07	607.82	605.16	622.66	620.31	600.94	599.89	597.28	
MINIMUM	597.52	596.69	595.91	595.90	599.53	599.29	600.54	600.83	600.94	599.28	597.28	595.54	
POOL CONTENT-EOM (1000AC. FT)	890.27	878.89	868.57	923.05	919.08	975.10	939.50	1208.36	938.64	920.07	886.93	862.97	

RED RIVER BASIN

DEQUEEN LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1979 THRU 1990	12.6	22.1	8.9	16.4	27.2	33.1	22.6	31.1	12.6	9.1	2.3	4.6	202.5
WY 1990	.4	.2	1.1	34.2	33.6	51.6	31.9	78.6	25.0	5.3	1.4	1.3	264.5
RELEASES (1,000 AC. FT.)													
AVG 1979 THRU 1990	8.0	16.6	28.1	20.0	24.2	28.5	27.4	26.5	23.6	10.9	4.7	3.3	221.8
WY 1990	.7	.6	.6	31.0	34.3	42.0	39.8	31.9	65.1	4.6	2.1	1.4	254.1
BASIN RAINFALL (INCHES)													
AVG 1980 THRU 1990	5.6	5.2	4.6	2.6	4.0	5.1	4.3	7.7	4.5	5.2	2.8	4.6	56.0
WY 1990	1.3	.8	2.4	6.3	4.6	9.1	6.3	13.3	3.0	5.8	.9	4.2	58.0
DEVIATION	-4.3	-4.4	-2.2	3.7	.6	4.0	2.1	5.7	-1.4	.6	-1.9	-.4	2.0
POOL ELEVATION													
END OF MONTH	436.54	436.15	436.33	438.03	437.43	442.48	437.99	457.99	437.21	437.30	436.53	436.23	
MAXIMUM	436.94	436.54	436.33	449.33	448.81	448.41	443.01	461.40	463.57	438.13	437.30	436.53	
MINIMUM	436.54	436.15	436.02	436.35	436.99	437.17	436.86	437.92	437.21	436.73	436.53	436.21	
POOL CONTENT EOM													
(1,000 AC. FT.)	34.1	33.5	33.3	36.7	35.5	44.9	36.6	82.5	35.3	35.4	34.1	33.6	

GILLHAM LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1976 THRU 1990	17.2	32.6	45.1	27.6	42.7	66.7	43.4	51.4	21.5	16.8	3.8	5.5	374.3
WY 1990	.7	.7	1.8	58.4	53.1	83.0	53.1	144.0	30.3	3.4	1.4	6.5	436.6
RELEASES (1,000 AC. FT.)													
AVG 1976 THRU 1990	9.3	26.2	43.9	34.8	36.7	50.9	51.2	41.0	30.7	14.9	8.9	4.1	352.5
WY 1990	1.3	1.1	1.2	49.6	59.2	75.9	53.4	69.2	95.5	3.6	3.4	3.3	416.7
BASIN RAINFALL (INCHES)													
AVG 1980 THRU 1990	5.3	5.5	4.8	2.8	4.2	5.3	4.4	7.5	4.6	5.7	2.7	4.5	57.2
WY 1990	1.1	1.0	2.6	7.5	5.4	8.3	6.0	15.7	3.5	5.6	1.2	6.3	64.3
DEVIATION	-4.2	-4.5	-2.2	4.8	1.3	3.0	1.7	8.2	-1.1	-.1	-1.6	1.8	7.1
POOL ELEVATION													
END OF MONTH	500.76	500.31	500.72	506.43	502.34	507.04	506.12	539.35	502.66	502.13	500.32	502.49	
MAXIMUM	501.40	500.76	500.72	526.18	523.04	521.70	508.10	542.74	544.85	502.66	502.15	501.38	
MINIMUM	500.75	500.31	500.23	500.77	502.33	502.23	501.98	505.91	502.66	501.56	500.32	501.38	
POOL CONTENT EOM													
(1,000 AC. FT.)	31.4	30.8	31.3	39.4	33.5	40.4	39.0	111.0	33.9	33.2	30.8	33.7	

RED RIVER BASIN

DIERKS LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1976 THRU 1990	5.7	10.8	6.3	10.0	16.3	24.7	15.2	17.1	10.0	5.5	1.2	1.7	124.6
WY 1990	.1	.1	.2	18.7	22.7	42.1	17.9	49.4	16.7	.8	.2	3.4	172.2
RELEASES (1,000 AC. FT.)													
AVG 1976 THRU 1990	3.9	7.0	14.7	14.6	13.5	19.9	18.6	15.5	11.7	6.7	2.2	.8	129.2
WY 1990	0.4	0.2	.4	13.4	23.5	30.3	28.8	21.9	38.9	1.1	1.1	.8	160.3
BASIN RAINFALL (INCHES)													
AVG 1980 THRU 1990	5.6	5.4	5.4	2.9	4.5	5.5	4.5	7.1	4.9	5.2	2.7	4.5	58.1
WY 1990	1.3	1.0	2.2	7.7	6.1	10.6	5.8	14.6	4.4	6.2	1.1	6.8	67.8
DEVIATION	-4.3	-4.5	-3.2	4.9	1.6	5.1	1.3	7.5	-.5	.9	-1.6	2.3	9.6
POOL ELEVATION													
END OF MONTH	523.84	523.42	523.13	527.02	526.39	533.80	526.54	541.49	526.02	525.43	524.35	526.11	
MAXIMUM	524.41	523.84	523.42	532.82	535.36	541.31	533.80	542.29	544.96	526.02	525.43	524.42	
MINIMUM	523.84	523.42	523.09	523.13	526.39	525.93	525.45	526.47	526.02	525.27	524.35	524.41	
POOL CONTENT EOM													
(1,000 AC. FT.)	26.8	26.3	25.9	31.1	30.2	41.6	30.4	56.4	29.7	28.9	27.5	29.8	

MILLWOOD LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS (1,000 AC. FT.)													
AVG 1973 THRU 1990	159.8	396.2	524.9	367.4	499.0	689.2	580.0	590.9	490.3	172.8	80.5	90.4	4641.6
WY 1990	25.4	19.7	21.4	424.1	832.5	1358.7	944.8	1401.4	1177.8	89.1	116.8	98.0	6509.8
RELEASES (1,000 AC. FT.)													
AVG 1967 THRU 1990	112.3	292.4	455.4	350.4	436.5	583.4	492.1	563.8	423.0	138.7	64.3	107.0	4019.4
WY 1990	19.4	13.9	12.9	309.4	834.4	1174.3	1104.5	1190.4	1148.6	74.6	110.6	87.9	6080.9
INTERVENING BASIN RAINFALL (INCHES)													
AVG 1980 THRU 1990	4.9	4.9	4.4	2.4	4.0	4.8	3.9	6.7	4.7	4.2	2.6	4.1	51.7
WY 1990	1.5	.7	1.8	6.7	4.8	10.3	6.7	12.2	3.7	4.9	1.6	4.1	58.9
DEVIATION	-3.4	-4.2	-2.6	4.2	.7	5.5	2.8	5.5	-1.0	.6	-1.0	-0.0	7.2
POOL ELEVATION													
END OF MONTH	255.39	255.53	255.79	260.02	258.98	264.19	259.34	261.95	259.53	259.66	259.49	259.60	
MAXIMUM	255.42	255.57	255.79	261.45	261.87	266.27	265.45	275.67	263.55	259.83	259.76	259.49	
MINIMUM	255.23	255.36	255.50	255.79	258.98	258.57	259.34	259.20	259.53	258.86	259.19	255.31	
POOL CONTENT EOM													
(1,000 AC. FT.)	109.6	112.6	118.1	229.7	198.6	376.7	209.3	293.3	215.0	218.9	213.8	217.1	

RED RIVER BASIN

WRIGHT PATMAN LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC.FT)													
Avg 1957 thru 1990	67.9	169.4	272.0	162.3	250.9	308.4	287.4	407.5	194.7	67.0	16.6	32.0	2236.2
WY 1990	0.0	0.0	3.5	249.9	394.5	1137.0	694.9	1051.6	280.3	19.3	14.6	27.2	3872.8
Releases(1000 AC.FT)													
Avg 1957 thru 1990	91.9	150.3	223.0	215.4	230.5	265.1	224.6	234.0	242.5	232.4	67.3	39.6	2217.1
WY 1990	50.5	25.2	7.4	59.7	476.0	415.5	595.0	243.5	591.7	606.3	504.0	36.0	3611.5
Rainfall (inches)													
Avg 1958 thru 1990	3.68	3.62	3.79	2.12	3.03	3.79	3.98	4.16	3.63	2.76	2.02	3.31	39.89
WY 1990	1.39	1.59	1.59	7.03	2.90	10.64	4.90	8.38	3.35	1.76	0.46	4.21	48.20
Deviation	-2.29	-2.03	-2.20	4.91	-0.13	6.85	0.92	4.22	-0.28	-1.00	-1.56	0.90	8.31
Pool Elevation													
End of Month	222.71	221.20	220.67	227.34	224.40	240.48	241.73	251.65	247.51	238.29	226.38	225.14	
Maximum	225.27	222.71	221.20	227.47	229.10	240.72	243.22	252.16	252.22	247.51	238.29	226.38	
Minimum	222.71	221.20	220.52	220.65	224.40	224.27	240.48	241.38	247.51	238.29	226.38	225.14	
Pool Content EOM (1000 AC. FT.)	206.55	170.88	159.28	341.61	251.27	958.72	1037.83	1817.72	1457.81	829.45	310.37	272.55	

LAKE O THE PINES	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC.FT)													
Avg 1958 thru 1990	11.5	26.7	55.9	49.7	71.5	96.0	76.9	70.2	32.9	10.6	4.8	10.9	517.6
WY 1990	0.0	0.1	4.4	47.3	45.0	237.9	142.2	136.5	31.1	1.9	6.5	10.8	663.8
Releases(1000 AC.FT)													
Avg 1958 thru 1990	9.2	14.0	45.0	53.3	62.8	75.4	67.9	56.7	41.5	13.8	9.5	11.6	460.6
WY 1990	7.8	2.7	2.8	10.9	63.1	65.1	165.1	105.7	148.2	5.7	2.8	6.3	586.2
Rainfall (inches)													
Avg 1980 thru 1990	5.13	4.68	4.99	2.99	4.24	4.31	3.29	4.80	4.56	1.77	1.67	2.18	44.61
WY 1990	3.19	0.97	1.25	10.81	4.69	9.36	5.64	7.39	2.34	1.67	0.45	4.40	52.16
Deviation	-1.94	-3.71	-3.74	7.82	0.45	5.05	2.35	2.59	-2.22	-0.10	-1.22	2.22	7.55
Pool Elevation													
End of Month	228.54	228.15	228.08	229.84	228.74	236.42	235.24	236.16	230.47	229.76	229.35	229.17	
Maximum	229.22	228.54	228.15	230.06	230.25	236.42	237.14	237.60	236.16	230.47	229.85	229.57	
Minimum	228.36	228.15	227.92	228.03	228.67	228.68	235.24	234.95	230.47	229.76	229.35	229.13	
Pool Content EOM (1000 AC. FT.)	255.60	248.35	247.07	280.53	259.35	427.67	398.47	421.13	293.06	278.96	270.98	267.52	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
SAM RAYBURN RESERVOIR													
Inflows(1000 AC.FT)													
Avg 1908 thru 1990	42.3	94.8	185.2	255.4	267.6	283.0	276.7	309.0	147.1	60.7	34.2	32.4	1988.2
WY 1990	27.3	20.7	69.3	445.0	432.0	276.9	248.4	601.0	394.8	31.5	14.5	23.1	2584.6
Releases(1000 AC.FT)													
Avg 1966 thru 1990	75.1	55.2	62.7	105.6	127.0	187.6	163.5	192.6	210.4	175.1	153.7	103.4	1611.3
WY 1990	117.1	127.2	149.4	15.7	217.8	207.1	266.3	423.7	418.1	174.1	192.6	150.4	2459.7
Rainfall (inches)													
Avg 1970 thru 1990	5.02	5.61	5.62	5.24	4.56	5.22	4.00	6.16	5.86	4.93	3.62	3.75	59.59
WY 1990	2.92	2.81	6.40	14.48	5.76	7.03	5.17	6.98	3.40	3.52	1.44	3.03	62.94
Deviation	-2.10	-2.80	0.78	9.24	1.20	1.81	1.17	0.82	-2.46	-1.41	-2.18	-0.72	3.35
Pool Elevation													
End of Month	161.64	160.38	159.42	163.25	164.93	165.30	164.81	165.95	165.25	163.50	161.28	159.62	
Maximum	162.83	161.64	160.38	163.25	165.35	165.30	165.91	165.95	168.36	165.25	163.50	161.28	
Minimum	161.64	160.38	158.74	159.42	163.25	164.34	164.79	164.69	165.25	163.50	161.28	159.62	
Pool Content EOM (1000 AC. FT.)	2592.46	2459.73	2361.48	2768.29	2959.27	3002.39	2945.37	3079.10	2996.54	2796.22	2554.10	2381.75	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
B. A. STEINHAGEN LAKE													
Inflows(1000 AC.FT)													
Avg 1908 thru 1990	83.2	156.0	284.5	426.9	434.9	501.5	501.5	582.2	312.3	164.1	93.8	75.1	3615.9
WY 1990	177.7	181.8	215.5	317.8	510.6	520.4	760.1	770.5	1041.8	231.6	221.3	181.5	5130.5
Releases(1000 AC.FT)													
Avg 1952 thru 1990	105.7	143.8	247.6	320.2	353.7	419.9	406.9	554.0	341.7	219.0	140.0	117.3	3369.7
WY 1990	173.8	171.8	203.9	328.6	506.1	517.1	756.8	771.8	1037.7	224.0	215.8	176.4	5083.8
Rainfall (inches)													
Avg 1970 thru 1990	3.77	4.91	5.42	4.55	3.79	4.58	4.02	6.49	6.16	3.28	2.89	3.93	53.79
WY 1990	4.00	1.13	1.46	7.71	4.15	9.07	4.02	5.39	4.67	2.14	2.02	1.95	47.71
Deviation	0.23	-3.78	-3.96	3.16	0.36	4.49	0.00	-1.10	-1.49	-1.14	-0.87	-1.98	-6.08
Pool Elevation													
End of Month	81.89	82.49	83.21	82.24	82.42	82.46	82.44	81.99	81.85	81.99	81.86	81.88	
Maximum	82.66	82.54	83.21	83.21	82.74	84.04	82.84	83.06	83.25	82.51	82.60	82.50	
Minimum	81.79	81.47	81.77	82.05	81.64	81.48	81.57	81.20	81.11	81.52	81.22	81.76	
Pool Content EOM (1000 AC. FT.)	79.93	87.45	97.16	84.26	86.55	87.06	86.80	81.15	79.45	81.15	79.57	79.81	

TRINITY RIVER BASIN

BENBROOK LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC. FT)													
Avg 1924 thru 1990	2.6	2.4	2.3	2.8	5.8	7.5	9.9	14.0	7.7	1.7	1.2	1.5	59.3
WY 1990	1.0	0.7	0.2	3.1	5.3	35.3	84.8	94.4	7.0	1.8	2.3	0.7	236.5
Releases(1000 AC. FT)													
Avg 1953 thru 1990	1.1	3.3	1.5	1.9	3.1	5.3	4.8	12.1	13.9	3.7	1.2	1.0	52.9
WY 1990	1.5	0.6	0.5	0.4	0.3	20.4	20.4	147.7	22.7	2.3	1.4	2.3	220.5
Rainfall (inches)													
Avg 1953 thru 1990	3.10	2.02	1.87	1.65	1.91	2.53	3.62	4.61	3.28	2.26	2.01	3.19	32.04
WY 1990	1.29	0.46	0.58	3.02	4.40	7.36	6.59	6.93	2.51	2.33	1.77	1.21	38.45
Deviation	-1.81	-1.56	-1.29	1.37	2.49	4.83	2.97	2.32	-0.77	0.07	-0.24	-1.98	6.41
Pool Elevation													
End of Month	692.70	692.36	692.09	692.55	693.67	697.21	709.85	698.80	694.21	693.33	692.87	691.88	
Maximum	693.42	692.70	692.36	692.55	693.67	699.68	709.85	717.54	699.32	694.21	693.51	692.87	
Minimum	692.63	692.36	692.05	692.09	692.55	693.67	696.21	698.80	694.21	693.33	692.87	691.88	
Pool Content EOM (1000 AC. FT.)	83.42	82.19	81.21	82.88	87.01	100.92	163.90	107.69	89.04	85.74	84.05	80.46	

JOE POOL LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC. FT)													
Avg 1987 thru 1990	1.2	1.4	2.2	3.6	11.0	7.0	12.4	47.5	13.8	1.5	2.3	2.1	105.8
WY 1990	0.8	0.2	0.0	5.7	15.3	9.2	45.4	68.2	4.7	2.4	2.9	1.4	154.1
Releases(1000 AC. FT)													
Avg 1987 thru 1990	0.2	0.2	0.3	0.2	1.1	1.4	1.1	11.9	18.5	9.0	0.2	0.2	44.4
WY 1990	0.1	0.1	0.1	0.1	3.7	4.9	3.8	45.4	56.4	0.3	0.3	0.3	115.5
Rainfall (inches)													
Avg 1986 thru 1990	2.40	2.31	2.06	1.75	3.57	2.24	2.80	6.86	5.00	2.49	1.77	3.02	36.26
WY 1990	1.44	0.53	0.23	2.88	5.08	4.50	5.78	7.61	2.97	3.23	1.95	1.72	37.92
Deviation	-0.96	-1.78	-1.83	1.13	1.51	2.26	2.98	0.75	-2.03	0.74	0.18	-1.30	1.66
Pool Elevation													
End of Month	521.04	520.65	520.25	520.78	522.12	522.49	527.11	529.20	522.26	521.86	521.48	521.03	
Maximum	521.52	521.04	520.65	520.78	522.60	522.93	527.11	533.21	529.20	522.26	521.96	521.48	
Minimum	521.00	520.65	520.24	520.20	520.78	522.08	522.26	527.11	522.26	521.84	521.48	521.03	
Pool Content EOM (1000 AC. FT.)	169.81	166.97	164.10	167.92	177.79	180.58	217.79	236.21	178.84	175.85	173.03	169.73	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
RAY ROBERTS LAKE													
Inflows(1000 AC.FT)													
Avg 1987 thru 1990	2.7	5.7	41.5	29.2	34.2	60.4	81.1	96.8	60.8	17.1	7.1	11.5	448.2
WY 1990	6.2	1.3	1.3	36.7	26.0	159.3	306.3	208.2	44.7	78.9	20.4	4.3	853.4
Releases(1000 AC.FT)													
Avg 1987 thru 1990	0.1	0.1	0.1	0.1	0.1	0.1	19.9	50.7	37.6	19.4	15.8	0.1	144.2
WY 1990	0.1	0.1	0.1	0.1	0.1	0.1	79.2	202.6	150.1	77.1	62.7	0.1	572.5
Rainfall (inches)													
Avg 1987 thru 1990	2.05	3.39	2.64	3.31	3.32	4.64	3.11	6.80	5.03	3.09	2.12	4.21	43.71
WY 1990	3.00	0.50	0.30	3.30	3.50	9.60	8.30	9.20	2.60	3.10	3.90	4.70	36.95
Deviation	0.95	-2.89	-2.34	-0.01	0.18	4.96	5.19	2.40	-2.43	0.01	1.78	0.49	-6.76
Pool Elevation													
End of Month	627.52	627.16	626.86	628.03	628.80	634.16	640.55	640.25	636.51	634.64	631.49	631.05	
Maximum	627.86	627.52	627.16	628.03	628.80	634.16	640.66	644.44	640.65	636.51	634.64	631.49	
Minimum	627.40	627.16	626.84	626.81	628.03	628.80	634.16	640.24	636.51	634.64	631.49	631.05	
Pool Content EOM (1000 AC. FT.)	663.52	654.37	646.81	676.61	696.73	849.71	1066.48	1055.43	924.89	864.64	770.55	758.09	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
LEWISVILLE LAKE													
Inflows(1000 AC.FT)													
Avg 1924 thru 1990	38.9	28.7	26.6	25.3	45.2	60.5	74.6	103.7	60.9	19.6	11.6	27.3	522.9
WY 1990	7.9	2.6	4.1	42.3	44.5	198.5	388.6	528.7	195.0	106.7	89.6	7.2	1615.7
Releases(1000 AC.FT)													
Avg 1955 thru 1990	25.1	36.4	36.8	24.2	26.7	35.8	37.2	77.6	84.8	49.9	32.4	20.7	487.6
WY 1990	12.2	14.1	10.7	6.6	3.3	82.2	134.4	531.1	319.9	179.2	134.0	17.4	1445.1
Rainfall (inches)													
Avg 1955 thru 1990	3.38	2.45	1.96	1.79	2.35	3.04	4.03	5.15	3.52	2.13	2.04	3.83	35.68
WY 1990	1.39	0.99	0.59	4.62	5.13	7.24	9.04	6.21	1.74	2.64	2.47	0.51	42.57
Deviation	-1.99	-1.46	-1.37	2.83	2.78	4.20	5.01	1.06	-1.78	0.51	0.43	-3.32	6.89
Pool Elevation													
End of Month	521.14	520.31	519.69	520.65	521.81	525.33	532.10	531.52	527.33	524.35	522.09	521.07	
Maximum	521.93	521.14	520.31	520.65	521.81	526.08	532.10	536.73	531.60	527.33	524.35	522.09	
Minimum	521.05	520.31	519.67	519.54	520.65	521.77	523.68	531.52	527.33	524.35	522.09	521.07	
Pool Content EOM (1000 AC. FT.)	615.84	592.17	574.91	601.80	635.38	743.41	985.68	963.08	809.75	712.46	543.65	613.82	

TRINITY RIVER BASIN

GRAPEVINE LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC. FT)													
Avg 1924 thru 1990	10.7	5.9	6.7	9.0	13.4	17.3	24.8	33.0	19.3	5.2	1.6	5.4	152.3
WY 1990	0.9	0.7	0.6	8.5	9.1	71.2	195.7	174.7	24.9	8.0	3.2	0.0	497.3
Releases(1000 AC. FT)													
Avg 1953 thru 1990	4.4	7.1	9.7	7.9	5.4	6.7	11.1	15.6	20.7	17.3	13.2	5.1	124.2
WY 1990	2.6	1.8	2.0	1.8	1.6	22.6	37.9	144.1	108.6	85.4	38.8	3.6	450.8
Rainfall (inches)													
Avg 1953 thru 1990	3.10	2.31	1.94	1.72	2.05	2.79	3.82	5.11	3.23	2.22	1.97	3.53	33.79
WY 1990	1.27	0.54	0.37	4.40	4.46	7.16	8.64	6.36	1.77	3.00	1.55	0.69	40.21
Deviation	-1.83	-1.77	-1.57	2.68	2.41	4.37	4.82	1.25	-1.46	0.78	-0.42	-2.84	6.42
Pool Elevation													
End of Month	533.19	532.62	532.07	532.79	533.64	539.82	555.64	557.78	549.44	540.36	535.05	533.59	
Maximum	534.01	533.19	532.62	532.80	533.64	540.17	555.64	562.96	557.96	549.44	540.36	535.05	
Minimum	533.12	532.62	532.04	531.85	532.79	533.64	538.87	555.64	549.44	540.36	535.05	533.59	
Pool Content EOM (1000 AC. FT.)	168.17	164.21	160.44	165.38	171.33	218.15	373.08	398.02	306.39	222.59	181.47	170.98	

LAVON LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC. FT)													
Avg 1924 thru 1990	13.4	18.9	24.1	25.1	38.5	42.2	52.9	71.8	40.0	13.4	3.4	11.4	355.1
WY 1990	6.9	2.8	0.9	39.2	110.1	173.0	204.7	291.1	19.7	14.2	16.6	6.0	885.2
Releases(1000 AC. FT)													
Avg 1954 thru 1990	9.9	11.1	20.0	16.8	15.7	23.1	17.9	58.7	40.7	17.5	8.5	4.9	244.8
WY 1990	0.0	0.0	0.0	0.0	65.1	31.8	32.8	367.8	102.5	50.3	0.0	0.0	650.3
Rainfall (inches)													
Avg 1954 thru 1990	3.54	2.80	2.54	2.04	2.61	3.31	4.28	5.71	3.68	2.53	1.98	4.30	39.33
WY 1990	1.67	0.73	0.56	5.29	4.83	5.53	7.52	6.65	5.64	0.97	2.32	2.56	44.27
Deviation	-1.87	-2.07	-1.98	3.25	2.22	2.22	3.24	0.94	1.96	-1.56	0.34	-1.74	4.94
Pool Elevation													
End of Month	491.18	490.41	489.66	490.81	492.24	497.61	503.24	499.67	494.99	491.68	490.80	489.76	
Maximum	492.01	491.18	490.41	490.81	493.64	497.61	503.24	504.93	500.06	494.99	491.87	490.80	
Minimum	491.08	490.41	489.66	489.44	490.81	492.04	497.40	499.67	494.99	491.68	490.80	489.76	
Pool Content EOM (1000 AC. FT.)	439.25	423.44	408.42	431.60	461.67	587.12	740.46	640.52	523.45	449.73	431.39	410.41	

TRINITY RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
NAVARRO MILLS LAKE													
Inflows(1000 AC. FT)													
Avg 1907 thru 1990	5.7	6.3	9.2	9.2	10.6	12.7	17.3	28.6	14.5	3.4	1.4	2.7	121.6
WY 1990	0.9	0.5	0.1	7.7	14.5	86.8	25.2	66.5	6.9	1.4	1.7	1.0	213.0
Releases(1000 AC. FT)													
Avg 1963 thru 1990	2.2	6.2	7.4	6.3	6.3	9.2	8.7	14.5	22.3	7.3	0.2	1.6	91.1
WY 1990	0.0	0.0	0.0	0.0	8.1	17.5	47.7	30.9	73.5	0.0	0.0	0.0	177.7
Rainfall (inches)													
Avg 1963 thru 1990	4.22	2.87	2.50	1.83	2.43	3.07	3.44	5.75	2.96	1.84	2.23	3.30	36.42
WY 1990	0.88	1.04	0.92	3.17	4.35	9.72	3.89	8.39	1.28	0.64	4.37	2.09	40.74
Deviation	-3.34	-1.83	-1.58	1.34	1.92	6.65	0.45	2.64	-1.68	-1.20	2.14	-1.21	4.32
Pool Elevation													
End of Month	423.18	422.83	422.54	423.80	424.74	434.70	431.44	435.31	424.78	424.15	423.61	423.15	
Maximum	423.64	423.18	422.83	423.80	425.46	434.70	435.57	438.63	435.31	424.78	424.25	423.61	
Minimum	423.14	422.83	422.48	422.45	423.80	424.67	430.69	431.44	424.78	424.06	423.61	423.15	
Pool Content EOM (1000 AC. FT.)	50.45	48.79	47.44	53.47	58.18	125.21	99.61	130.34	58.39	55.20	52.54	50.31	
	OCT	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
BARDWELL LAKE													
Inflows(1000 AC. FT)													
Avg 1938 thru 1990	3.6	2.9	4.7	4.3	6.6	7.0	10.3	13.9	7.8	1.7	0.7	1.8	65.5
WY 1990	0.9	0.6	0.4	23.1	12.5	24.9	17.3	44.2	4.7	1.2	2.1	0.8	132.8
Releases(1000 AC. FT)													
Avg 1966 thru 1990	1.4	3.7	4.3	4.2	4.8	6.6	5.6	10.6	13.7	1.9	0.2	0.5	57.6
WY 1990	0.0	0.0	0.0	8.5	19.7	10.9	8.7	20.9	41.7	0.0	0.0	0.0	110.4
Rainfall (inches)													
Avg 1966 thru 1990	4.32	2.78	2.64	2.01	2.75	3.08	3.36	5.50	3.62	2.23	1.97	3.67	37.93
WY 1990	1.33	0.74	0.54	8.56	4.43	7.82	3.60	7.13	2.35	2.05	2.66	2.39	43.60
Deviation	-2.99	-2.04	-2.10	6.55	1.68	4.74	0.24	1.63	-1.27	-0.18	0.69	-1.28	5.67
Pool Elevation													
End of Month	420.00	419.77	419.62	423.34	421.13	424.51	426.26	430.82	421.25	420.78	420.56	420.15	
Maximum	420.35	420.00	419.77	425.25	424.88	426.32	426.26	434.54	431.88	421.25	420.98	420.56	
Minimum	419.94	419.77	419.56	419.59	421.00	421.13	423.30	426.26	421.25	420.78	420.56	420.15	
Pool Content EOM (1000 AC. FT.)	48.78	47.99	47.47	60.98	52.75	65.56	72.72	93.25	53.18	51.51	50.73	49.30	

SAN JACINTO BASIN

BARKER RESERVOIR	89 OCT	89 NOV	89 DEC	90 JAN	90 FEB	90 MAR	90 APR	90 MAY	90 JUN	90 JUL	90 AUG	90 SEP	TOTAL
INFLOWS (1000 AC. FT.)													
AUG 1945 thru 1990	5.7	6.4	6.7	9.0	7.8	4.2	4.9	8.1	9.9	6.9	4.3	7.0	80.8
FY 0	1.8	2.7	1.6	3.2	10.0	6.0	6.0	10.0	1.4	3.3	2.0	2.0	49.9
RELEASES (1000 AC. FT.)													
AUG. 1964 thru 1990	6.6	6.8	6.8	8.0	8.2	5.5	4.1	8.7	9.3	6.9	4.1	7.9	82.8
FY 90	1.9	2.7	1.6	3.2	9.1	4.7	5.6	11.4	1.4	3.2	2.0	2.0	48.7
RAINFALL (INCHES)													
AUG. 1945 thru 1990	3.59	3.56	3.20	3.03	2.95	3.17	3.05	4.48	4.02	3.13	3.67	4.09	41.97
FY 90	1.86	1.14	0.81	3.50	4.83	3.74	5.02	3.68	1.05	3.49	0.98	3.59	33.69
POOL ELEVATION													
END OF MONTH	75.36	73.69	74.02	73.85	79.73	83.55	84.13	73.73	74.01	73.90	73.69	73.67	
MAXIMUM	75.80	74.64	74.08	76.09	86.31	83.55	84.21	85.67	74.01	76.35	74.26	74.70	
MINIMUM	73.65	73.68	73.67	73.68	73.69	73.67	73.69	73.70	73.68	73.67	73.69	73.67	
POOL CONTENT E.O.M. (1000 AC. FT.)	0.00	0.00	0.00	0.00	0.03	1.02	1.48	0.00	0.00	0.00	0.00	0.00	
ADDICKS RESERVOIR													
INFLOWS (1000 AC. FT.)													
AUG. 1948 thru 1990	6.4	6.5	6.9	6.1	7.4	4.0	5.6	8.2	7.4	5.4	5.6	6.3	75.7
FY 90	2.6	1.7	1.4	3.1	10.3	9.5	9.0	8.4	2.6	7.0	2.8	3.2	61.6
RELEASES (1000 AC. FT.)													
AUG. 1964 thru 1990	7.5	7.6	7.3	7.1	7.6	4.8	4.8	9.4	8.3	5.9	4.3	7.4	82.0
FY 90	2.6	1.7	1.4	3.2	9.7	7.3	7.4	11.8	2.6	6.9	2.8	3.2	60.5
RAINFALL (INCHES)													
AUG. 1948 thru 1990	3.83	3.48	3.27	3.00	3.14	2.32	3.15	4.27	3.94	3.15	3.26	4.22	41.04
FY 90	1.70	1.18	0.76	3.14	4.10	3.88	5.04	3.52	1.03	3.53	1.01	3.59	32.49
POOL ELEVATION													
END OF MONTH	73.42	71.67	71.82	71.79	75.89	86.83	88.67	71.78	71.87	77.40	71.80	71.71	
MAXIMUM	76.44	72.11	71.82	75.54	88.86	86.83	88.73	90.28	78.92	77.40	77.40	76.48	
MINIMUM	71.77	71.67	71.67	71.68	71.70	72.04	71.64	71.76	71.67	71.81	71.70	71.68	
POOL CONTENT E.O.M. (1000 AC. FT.)	0.00	0.00	0.00	0.00	0.02	2.19	3.91	0.00	0.00	0.06	0.00	0.00	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
WHITNEY LAKE													
Inflows(1000 AC.FT)													
Avg 1899 thru 1990	113.5	63.4	64.3	54.0	58.4	70.1	138.8	276.5	174.0	92.7	67.6	102.5	1275.7
WY 1990	17.3	9.2	19.5	25.8	38.9	207.2	1032.2	1071.6	321.7	25.4	51.1	75.7	2895.6
Releases(1000 AC.FT)													
Avg 1952 thru 1990	89.2	49.1	37.7	47.4	40.9	57.7	68.7	223.8	196.3	75.1	49.4	62.0	997.4
WY 1990	30.3	14.5	39.1	17.2	24.0	150.1	422.7	1356.1	608.5	34.5	39.0	22.8	2758.6
Rainfall (inches)													
Avg 1953 thru 1990	3.44	2.37	1.98	1.69	2.06	2.46	3.57	4.58	3.54	2.37	2.27	3.34	33.67
WY 1990	0.88	0.45	0.39	3.83	4.62	6.92	5.28	3.55	1.71	3.46	1.61	3.08	35.78
Deviation	-2.56	-1.92	-1.59	2.14	2.56	4.46	1.71	-1.03	-1.83	1.09	-0.66	-0.26	2.11
Pool Elevation													
End of Month	532.41	531.83	530.77	530.93	531.39	533.61	553.39	544.42	533.22	532.09	531.88	533.62	
Maximum	533.46	532.49	531.83	530.98	531.57	534.55	553.42	564.89	544.42	533.22	532.43	533.62	
Minimum	532.41	531.81	530.29	530.65	530.93	531.22	532.97	544.42	533.22	532.09	531.88	531.57	
Pool Content EOM (1000 AC. FT.)	613.51	600.17	576.32	579.87	590.19	641.79	1243.22	938.62	632.50	606.13	601.32	642.03	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
AQUILLA LAKE													
Inflows(1000 AC.FT)													
Avg 1982 thru 1990	3.6	1.5	8.7	3.5	7.1	9.3	5.5	8.0	10.4	0.8	0.8	2.2	61.3
WY 1990	0.4	0.2	0.0	7.4	13.6	23.6	36.3	20.0	0.4	0.8	0.9	0.7	104.3
Releases(1000 AC.FT)													
Avg 1982 thru 1990	0.5	0.3	4.0	2.5	2.9	5.3	3.2	6.4	11.7	1.2	0.1	0.0	38.0
WY 1990	0.1	0.1	0.1	0.5	10.4	15.6	11.6	32.8	16.2	0.1	0.1	0.1	87.6
Rainfall (inches)													
Avg 1982 thru 1990	6.18	2.60	3.64	1.54	3.08	2.90	2.17	4.33	5.91	1.09	1.54	4.88	39.86
WY 1990	1.33	0.50	0.67	4.10	4.82	6.48	4.35	5.56	1.60	1.98	2.70	2.86	36.95
Deviation	-4.85	-2.10	-2.97	2.56	1.74	3.58	2.18	1.23	-4.31	0.89	1.16	-2.02	-2.91
Pool Elevation													
End of Month	536.73	536.41	536.16	538.04	538.73	540.66	546.09	542.70	537.70	537.14	536.63	536.30	
Maximum	537.16	536.73	536.41	538.04	541.19	540.69	546.09	549.60	542.70	537.70	537.20	536.63	
Minimum	536.70	536.41	536.11	536.10	538.04	538.43	538.73	542.70	537.70	537.12	536.63	536.30	
Pool Content EOM (1000 AC. FT.)	49.88	48.37	48.10	54.15	56.51	63.50	87.00	71.64	53.02	51.19	49.56	48.53	

BRAZOS RIVER BASIN

WACO LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC. FT)													
Avg 1907 thru 1990	23.4	15.0	20.1	16.8	23.5	26.4	44.7	67.9	33.9	12.8	7.7	15.7	307.8
WY 1990	3.5	2.3	2.1	6.1	8.8	51.7	135.2	185.3	7.3	0.0	4.9	3.7	410.9
Releases(1000 AC. FT)													
Avg 1966 thru 1990	6.8	10.2	11.2	13.8	16.1	26.9	30.5	66.9	40.6	11.6	2.5	4.3	241.5
WY 1990	0.1	0.1	0.1	0.1	0.1	42.8	59.3	252.6	6.0	0.1	0.1	0.1	361.1
Rainfall (inches)													
Avg 1963 thru 1990	3.60	2.53	2.11	1.90	2.30	2.65	3.28	5.03	2.99	2.22	2.29	3.62	34.52
WY 1990	1.67	0.33	0.67	6.52	3.46	6.32	4.03	6.18	0.93	0.83	1.74	6.44	39.12
Deviation	-1.93	-2.20	-1.44	4.62	1.16	3.67	0.75	1.15	-2.06	-1.39	-0.55	2.82	4.60
Pool Elevation													
End of Month	454.26	453.93	453.66	453.97	454.74	455.44	464.34	455.21	454.38	452.89	452.29	451.92	
Maximum	454.71	454.26	453.93	453.97	454.74	456.86	466.03	469.44	455.38	454.38	453.00	452.29	
Minimum	454.23	453.93	453.60	453.62	453.97	454.74	455.12	455.10	454.38	452.88	452.29	451.92	
Pool Content EOM (1000 AC. FT.)	143.87	141.53	139.62	141.81	147.31	152.38	223.90	150.71	144.73	134.24	130.10	127.57	

PROCTOR LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC. FT)													
Avg 1922 thru 1990	3.4	1.8	1.5	3.5	2.7	5.0	9.8	16.0	10.5	3.1	1.9	3.0	62.0
WY 1990	1.1	0.6	0.3	2.0	3.7	12.4	326.7	186.4	31.2	24.5	31.2	5.3	625.4
Releases(1000 AC. FT)													
Avg 1964 thru 1990	2.6	2.1	2.0	3.1	5.2	4.7	8.4	20.3	19.2	17.5	7.6	3.7	96.5
WY 1990	3.1	0.6	0.2	0.2	0.2	6.3	27.6	294.9	118.9	79.4	49.7	7.3	588.3
Rainfall (inches)													
Avg 1964 thru 1990	2.76	1.88	1.37	1.48	1.83	2.11	3.14	4.73	3.46	1.66	2.24	3.57	30.23
WY 1990	0.93	0.34	0.58	2.28	3.18	1.84	10.26	3.71	2.35	4.49	2.21	3.36	35.53
Deviation	-1.83	-1.54	-0.79	0.80	1.35	-0.27	7.12	-1.02	-1.11	2.83	-0.03	-0.21	5.30
Pool Elevation													
End of Month	1161.20	1160.78	1160.60	1160.76	1161.33	1162.38	1195.83	1186.37	1176.12	1167.37	1163.06	1162.07	
Maximum	1162.26	1161.20	1160.79	1160.81	1161.33	1162.65	1195.83	1197.62	1186.37	1176.12	1168.79	1163.06	
Minimum	1161.17	1160.78	1160.58	1160.54	1160.76	1161.33	1162.07	1186.37	1176.12	1167.37	1163.06	1162.07	
Pool Content EOM (1000 AC. FT.)	55.77	53.93	53.16	53.85	56.35	61.16	357.99	242.87	147.41	87.44	64.40	59.72	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
BELTON LAKE													
Inflows(1000 AC.FT)													
Avg 1908 thru 1990	29.8	19.9	29.5	29.2	34.4	37.0	60.5	100.3	53.2	25.4	14.3	24.8	458.4
WY 1990	6.7	1.7	0.0	4.7	7.1	38.3	107.8	371.3	129.4	72.7	38.2	17.7	795.6
Releases(1000 AC.FT)													
Avg 1955 thru 1990	21.3	19.7	17 2	24.2	23.5	33.2	29.2	60.0	67 8	49.8	17.7	11.0	374.6
WY 1990	3.6	2.1	2.3	1.8	1.6	11.6	36.0	280.5	245.2	73.7	25.7	13.1	697.2
Rainfall (inches)													
Avg 1954 thru 1990	3.75	2.46	1.91	1.73	2.38	2.18	3.19	4.47	3.54	1.98	2.28	3.62	33.49
WY 1990	2.04	0.55	0.29	1.04	3.03	3.77	3.18	4.00	0.21	4.82	0.97	5.70	29.60
Deviation	-1.71	-1.91	-1.62	-0.69	0.65	1.59	-0.01	-0.47	-3.33	2.84	-1.31	2.08	-3.89
Pool Elevation													
End of Month	593.57	593.07	592.48	592.37	592.49	594.32	599.35	605.13	595.80	594.81	594.79	594.50	
Maximum	594.07	593.57	593.07	592.48	592.51	594.82	599.35	608.56	605.13	595.80	595.13	595.11	
Minimum	593.48	593.07	592.48	592.33	592.37	592.42	594.32	599.35	595.80	594.81	594.76	594.50	
Pool Content EOM (1000 AC. FT.)	436.66	430.54	423.39	422.06	423.51	445.97	511.66	593.03	464.76	452.13	451.88	448.23	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
STILLHOUSE HOLLOW LAKE													
Inflows(1000 AC.FT)													
Avg 1924 thru 1990	13.1	9.2	12.5	14.8	20.7	22.0	24.2	42.9	16.2	9.9	4.3	9.8	199.7
WY 1990	1.4	0.6	0.0	2.2	2.7	12.1	26.0	41.6	7.9	1.4	1.9	6.5	104.3
Releases(1000 AC.FT)													
Avg 1968 thru 1990	6.5	7.0	8.0	13.5	11.1	14.2	15.8	27.6	22.9	23.8	3.5	5.1	159.0
WY 1990	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	25.9	7.0	0.0	1.4	45.0
Rainfall (inches)													
Avg 1967 thru 1990	3.50	2.35	1.88	1.68	2.49	2.52	2.86	4.56	3.61	2.19	2.35	3.54	33.53
WY 1990	1.94	0.28	0.39	1.19	2.58	3.80	3.42	4.14	0.47	4.20	0.40	7.11	29.92
Deviation	-1.56	-2.07	-1.49	-0.49	0.09	1.28	0.56	-0.42	-3.14	2.01	-1.95	3.57	-3.61
Pool Elevation													
End of Month	617.93	617.66	617.35	617.43	617.64	619.38	623.10	627.16	623.84	622.36	621.85	622.13	
Maximum	618.28	617.93	617.66	617.44	617.64	619.38	623.10	627.43	627.81	623.84	622.38	622.48	
Minimum	617.85	617.66	617.33	617.32	617.43	617.62	619.38	623.10	623.84	622.36	621.85	621.71	
Pool Content EOM (1000 AC. FT.)	210.45	208.85	207.02	207.49	208.73	219.23	242.84	270.43	247.72	238.03	234.74	236.54	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
GEORGETOWN LAKE													
Inflows(1000 AC.FT)													
Avg 1980 thru 1990	9.9	6.6	14.7	7.8	15.6	13.9	6.4	19.7	34.6	12.9	3.0	6.8	151.8
WY 1990	0.1	0.0	0.0	0.3	0.4	0.9	0.8	2.2	0.0	0.2	0.3	0.3	5.4
Releases(1000 AC.FT)													
Avg 1980 thru 1990	1.3	1.2	3.4	2.4	4.4	5.9	2.0	4.2	6.8	10.9	0.6	2.6	45.8
WY 1990	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.2
Rainfall (inches)													
Avg 1981 thru 1990	4.34	3.32	2.13	1.41	2.61	2.80	2.11	4.91	4.75	1.50	1.83	2.80	34.53
WY 1990	1.82	1.21	0.14	1.71	2.91	5.15	4.23	3.69	0.89	2.26	1.43	4.11	29.55
Deviation	-2.52	-2.11	-1.99	0.30	0.30	2.35	2.12	-1.22	-3.86	0.76	-0.40	1.31	-4.98
Pool Elevation													
End of Month	787.46	786.69	785.88	785.48	785.29	785.57	785.62	786.63	785.63	784.62	783.46	782.73	
Maximum	788.36	787.46	786.69	785.88	785.58	765.77	785.65	786.65	786.63	785.63	784.62	783.46	
Minimum	787.44	786.69	785.88	785.48	785.26	785.21	785.30	785.62	785.63	784.62	783.46	782.73	
Pool Content EOM (1000 AC. FT.)	32.68	31.79	30.87	30.42	30.21	30.52	30.57	31.72	30.59	29.47	28.23	27.47	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
GRANGER LAKE													
Inflows(1000 AC.FT)													
Avg 1980 thru 1990	10.5	7.6	15.3	8.5	16.3	14.9	7.4	25.1	35.8	13.3	3.2	7.0	164.8
WY 1990	1.9	1.3	0.6	1.9	2.6	7.0	8.2	28.4	2.3	1.5	0.9	2.0	58.5
Releases(1000 AC.FT)													
Avg 1980 thru 1990	5.3	6.2	11.8	10.5	10.9	15.0	6.7	17.6	24.8	24.7	2.3	5.7	141.6
WY 1990	0.2	0.2	0.2	0.2	0.2	2.5	2.0	30.1	1.0	0.2	0.2	0.3	37.1
Rainfall (inches)													
Avg 1981 thru 1990	3.89	2.52	2.61	1.33	1.97	2.40	1.59	5.27	5.24	1.26	1.18	2.31	31.58
WY 1990	2.28	1.32	0.59	1.55	3.17	3.21	4.32	4.80	0.03	1.56	0.74	5.34	28.91
Deviation	-1.61	-1.20	-2.02	0.22	1.20	0.81	2.73	-0.47	-5.21	0.30	-0.44	3.03	-2.67
Pool Elevation													
End of Month	503.05	502.98	502.85	503.02	503.38	504.21	505.26	504.39	503.99	503.69	503.13	503.03	
Maximum	503.21	503.05	502.99	503.03	503.38	504.61	505.31	509.90	504.41	503.99	503.69	503.19	
Minimum	502.94	502.94	502.81	502.85	503.02	503.38	504.12	504.36	503.99	503.69	503.13	502.99	
Pool Content EOM (1000 AC. FT.)	61.47	61.18	60.65	61.34	62.84	66.43	71.15	67.23	65.46	64.16	61.80	61.38	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
SOMERVILLE LAKE													
Inflows(1000 AC.FT)													
Avg 1924 thru 1990	12.4	14.7	16.6	20.6	23.1	19.3	25.7	35.8	24.9	11.3	3.6	9.1	217.1
WY 1990	1.6	0.7	0.0	2.8	5.5	3.3	23.2	11.4	0.6	2.6	1.7	3.7	57.0
Releases(1000 AC.FT)													
Avg 1967 thru 1990	7.4	8.6	18.1	11.2	16.9	16.4	18.2	25.4	29.7	22.7	6.6	4.3	185.5
WY 1990	0.0	0.0	0.0	0.0	0.0	0.0	0.1	14.3	0.0	0.0	0.0	0.0	14.4
Rainfall (inches)													
Avg 1967 thru 1990	3.84	3.00	2.49	2.72	2.42	2.59	2.88	4.86	3.77	1.84	2.25	4.05	36.71
WY 1990	1.86	1.50	0.90	1.79	3.07	2.95	3.66	1.56	0.89	2.04	1.02	4.17	25.41
Deviation	-1.98	-1.50	-1.59	-0.93	0.65	0.36	0.78	-3.30	-2.88	0.20	-1.23	0.12	-11.30
Pool Elevation													
End of Month	236.86	236.67	236.42	236.49	236.79	236.85	238.60	237.88	237.22	236.82	236.22	236.05	
Maximum	237.16	236.86	236.67	236.55	236.79	236.87	238.60	239.02	237.88	237.22	236.82	236.25	
Minimum	236.79	236.67	236.37	236.40	236.49	236.68	236.77	237.88	237.22	236.82	236.22	236.05	
Pool Content EOM (1000 AC. FT.)	147.37	145.31	142.62	143.37	146.61	147.26	167.07	158.74	151.32	146.93	140.50	138.70	

COLORADO RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TWIN BUTTES LAKE													
Inflows(1000 AC.FT)													
Avg 1963 thru 1990	6.7	3.7	3.7	3.7	3.7	3.8	5.2	7.9	4.5	2.5	6.3	8.1	59.9
WY 1990	1.4	1.3	1.4	2.8	2.3	2.4	4.1	4.4	4.3	7.8	6.9	2.6	41.8
Releases(1000 AC.FT)													
Avg 1963 thru 1990	1.4	1.5	1.4	0.9	1.1	1.7	2.8	4.5	3.9	5.6	4.3	1.8	30.8
WY 1990	2.2	0.8	1.1	0.9	0.8	2.1	2.0	2.0	10.1	7.8	6.9	2.6	39.3
Rainfall (inches)													
Avg 1964 thru 1990	1.95	0.94	0.62	0.61	1.01	0.84	1.35	2.43	1.91	1.04	1.56	2.70	16.95
WY 1990	0.22	2.06	0.08	1.55	0.64	0.36	1.07	1.70	0.00	1.45	0.44	1.15	10.72
Deviation	-1.73	1.12	-0.54	0.94	-0.37	-0.48	-0.28	-0.73	-1.91	0.41	-1.12	-1.55	-6.23
Pool Elevation													
End of Month	1927.39	1927.10	1926.93	1927.01	1927.06	1926.83	1926.87	1926.79	1925.63	1926.04	1925.81	1926.50	
Maximum	1928.17	1927.39	1927.10	1927.05	1927.06	1927.26	1926.88	1927.00	1926.79	1926.20	1926.08	1929.30	
Minimum	1927.39	1927.09	1926.91	1926.92	1926.94	1926.83	1926.60	1926.74	1924.42	1925.37	1925.81	1925.72	
Pool Content EOM (1000 AC. FT.)	90.39	89.09	88.33	88.68	88.91	87.89	88.06	87.71	82.73	84.46	83.49	86.44	

COLORADO RIVER BASIN

O. C. FISHER LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC. FT)													
Avg 1915 thru 1990	3.8	0.4	0.4	0.3	0.5	1.1	3.6	5.6	2.7	3.0	1.6	6.8	29.8
WY 1990	0.5	0.1	0.0	0.5	0.5	0.5	1.1	1.1	0.0	1.6	0.1	3.0	9.0
Releases(1000 AC. FT)													
Avg 1953 thru 1990	1.5	0.2	0.2	0.1	0.1	0.1	0.1	0.5	0.3	0.5	0.4	0.3	4.3
WY 1990	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rainfall (inches)													
Avg 1953 thru 1990	2.52	1.04	0.85	0.74	1.02	0.96	1.90	3.21	2.21	1.77	2.08	3.14	21.46
WY 1990	1.93	0.36	0.33	0.80	1.78	1.86	3.98	4.24	0.14	6.73	1.16	8.78	32.09
Deviation	-0.59	-0.68	-0.52	0.06	0.76	0.90	2.08	1.03	-2.07	4.96	-0.92	5.64	10.63
Pool Elevation													
End of Month	1885.49	1885.12	1884.85	1884.76	1884.73	1884.67	1884.78	1884.68	1883.74	1883.78	1883.20	1884.09	
Maximum	1885.88	1885.49	1885.12	1884.85	1884.76	1884.82	1884.81	1884.87	1884.68	1883.84	1883.78	1884.13	
Minimum	1885.37	1885.11	1884.84	1884.76	1884.63	1884.64	1884.61	1884.63	1883.74	1883.32	1883.20	1882.96	
Pool Content EOM (1000 AC. FT.)	35.06	34.21	33.60	33.40	33.33	33.19	33.44	33.22	31.14	31.23	29.98	31.91	

HORDS CREEK LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC. FT)													
Avg 1942 thru 1990	0.3	0.1	0.1	0.1	0.1	0.1	0.5	1.0	0.4	0.2	0.1	0.3	3.3
WY 1990	0.0	0.0	0.0	0.1	0.1	0.1	0.5	1.2	0.0	0.1	0.1	0.1	2.3
Releases(1000 AC. FT)													
Avg 1952 thru 1990	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.7
WY 1990	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rainfall (inches)													
Avg 1949 thru 1990	2.56	1.40	1.00	1.15	1.22	1.39	2.51	3.77	3.03	1.94	2.10	3.26	25.32
WY 1990	0.65	0.31	0.42	1.46	3.89	3.70	5.47	3.84	0.45	4.94	2.12	3.60	30.E5
Deviation	-1.91	-1.09	-0.58	0.31	2.67	2.31	2.96	0.07	-2.58	3.00	0.02	0.34	5.53
Pool Elevation													
End of Month	1887.09	1886.66	1886.28	1886.12	1886.21	1886.49	1888.14	1891.62	1890.59	1890.24	1889.83	1889.67	
Maximum	1887.71	1887.09	1886.66	1886.28	1886.22	1886.56	1888.15	1891.92	1891.62	1890.59	1890.47	1889.83	
Minimum	1887.09	1886.66	1886.28	1886.12	1886.07	1886.20	1886.41	1888.14	1890.59	1890.07	1889.83	1889.49	
Pool Content EOM (1000 AC. FT.)	3.36	3.25	3.16	3.12	3.14	3.21	3.63	4.66	4.33	4.23	4.10	4.06	

COLORADO RIVER BASIN

MARSHALL FORD LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC.FT)													
Avg 1941 thru 1990	123.1	60.2	56.0	75.2	76.8	84.1	111.4	223.0	176.3	93.9	81.7	106.0	1267.8
WY 1990	6.8	5.3	2.4	9.3	19.2	53.4	73.1	429.1	53.2	117.3	70.6	171.1	1010.7
Releases(1000 AC.FT)													
Avg 1944 thru 1990	66.9	59.0	46.4	46.5	49.4	68.5	93.8	162.2	185.7	127.6	114.2	82.5	1102.7
WY 1990	33.1	0.2	0.0	5.3	4.8	11.5	36.1	124.5	140.1	98.9	108.3	85.6	648.4
Rainfall (inches)													
Avg 1952 thru 1990	3.22	1.91	1.38	1.22	1.77	1.61	2.64	4.20	3.22	1.91	2.11	3.08	28.26
WY 1990	2.93	1.69	0.12	0.72	2.92	3.98	2.90	1.29	1.14	5.94	1.39	2.19	27.21
Deviation	-0.29	-0.22	-1.26	-0.50	1.15	2.37	0.26	-2.91	-2.08	4.03	-0.72	-0.89	-1.05
Pool Elevation													
End of Month	655.35	655.33	655.32	655.39	656.23	658.96	661.26	679.27	673.66	674.14	671.12	675.61	
Maximum	657.75	655.42	655.33	655.50	656.23	659.39	661.26	680.84	679.33	674.25	675.34	675.61	
Minimum	655.04	655.10	654.97	655.20	655.39	656.23	657.70	661.26	673.66	669.99	671.12	670.88	
Pool Content EOM (1000 AC. FT.)	759.21	758.94	758.81	759.76	771.23	809.38	842.55	1139.17	1039.02	1047.30	996.17	1072.98	

CANYON LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows(1000 AC.FT)													
Avg 1915 thru 1990	30.5	16.3	18.2	20.5	20.9	23.3	29.8	39.2	35.0	23.6	18.1	25.7	301.0
WY 1990	7.1	5.7	4.0	6.9	8.5	17.8	21.6	80.2	13.4	30.8	30.7	14.7	241.5
Releases(1000 AC.FT)													
Avg 1959 thru 1990	18.7	18.4	14.2	17.6	17.6	19.4	20.7	24.4	31.3	30.4	28.9	17.2	258.6
WY 1990	6.7	9.9	10.3	6.3	5.7	11.9	13.8	34.1	23.5	17.7	30.9	16.4	187.1
Rainfall (inches)													
Avg 1963 thru 1990	3.51	2.60	1.72	1.90	1.89	1.95	2.75	4.44	3.46	2.23	2.91	4.05	33.43
WY 1990	4.02	1.62	0.21	1.73	3.02	4.96	3.45	4.37	1.69	7.17	0.26	2.44	34.94
Deviation	0.51	-0.98	-1.51	-0.17	1.13	3.01	0.70	-0.07	-1.77	4.94	-2.65	-1.61	1.51
Pool Elevation													
End of Month	904.41	903.57	902.56	902.44	902.59	903.17	903.92	909.25	907.34	908.31	907.60	906.86	
Maximum	904.94	904.41	903.57	902.56	902.59	903.36	903.92	909.94	909.25	908.58	908.96	907.60	
Minimum	904.31	903.57	902.56	902.44	902.44	902.59	902.84	903.91	907.34	906.86	907.60	906.86	
Pool Content EOM (1000 AC. FT.)	345.34	338.86	331.18	330.27	331.41	335.81	341.55	384.06	368.49	376.35	370.59	364.64	

RIO GRANDE BASIN

PLATORO RESERVOIR

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
FY 1990	2.65	0.58	0.14	0.26	0.43	0.53	1.98	12.28	21.90	3.87	1.76	2.24	48.62
Releases (1000 Ac-Ft)													
FY 1990	4.10	0.31	0.31	0.31	0.23	0.25	1.92	12.24	19.70	9.30	6.42	3.71	58.50
Rainfall (Inches)	DATA IS NOT AVAILABLE												
Pool Elevation(EOM)	9979.48	9979.96	9979.66	9979.58	9979.93	9980.44	9980.55	9980.67	9984.02	9973.54	9963.63	9960.16	
Maximum	9982.25	9979.98	9979.99	9979.74	9979.93	9980.44	9980.76	9981.82	9986.57	9983.72	9973.10	9963.42	
Minimum	9979.48	9979.55	9979.66	9979.58	9979.61	9979.94	9980.46	9980.48	9980.43	9974.09	9963.63	9959.39	
Pool Content (EOM) (1000 Ac-Ft)	18.06	18.31	18.16	18.12	18.31	18.59	18.65	18.72	20.62	14.96	10.31	8.85	

Data for compiling averages unavailable

ABIQUIU DAM

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1926 thru 1990	11.93	13.58	12.02	5.50	9.69	19.64	51.18	94.85	51.92	26.11	25.56	18.12	340.11
FY 1990	7.74	7.30	7.82	7.89	8.75	9.52	13.10	31.12	27.27	32.99	22.01	25.82	201.32
Releases (1000 Ac-Ft)													
Avg 1963 thru 1990	12.81	21.55	20.50	10.17	11.90	22.64	46.67	65.43	53.25	32.31	24.42	18.35	340.01
FY 1990	5.03	2.76	6.24	3.22	3.00	6.53	12.18	28.70	25.45	27.65	26.25	37.30	184.31
Rainfall (Inches)													
Avg 1957 thru 1990	0.95	0.50	0.35	0.38	0.26	0.53	0.57	0.80	0.72	1.71	1.94	1.18	9.89
FY 1990	1.27	0.00	0.07	0.06	0.21	0.15	1.60	0.42	0.66	2.79	1.23	1.87	10.33
Pool Elevation (EOM)	6211.62	6212.60	6212.89	6213.98	6215.35	6215.77	6215.56	6215.53	6215.27	6216.18	6214.59	6211.22	
Maximum	6211.62	6212.60	6212.91	6213.98	6215.35	6215.78	6215.84	6215.69	6215.73	6216.24	6216.14	6214.37	
Minimum	6211.24	6211.63	6212.66	6212.91	6214.03	6215.39	6215.42	6214.91	6215.06	6215.02	6214.59	6211.22	
Pool Content (EOM) (1000 Ac-Ft)	158.18	161.92	163.03	167.23	172.58	174.23	173.40	173.28	172.26	175.86	169.60	156.66	

RIO GRANDE BASIN

BRANTLEY DAM

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
FY 1990	Data Unavailable												
Releases (1000 Ac-Ft)													
FY 1990	10.28	1.20	1.24	1.24	1.12	1.24	10.20	10.24	13.49	7.90	8.60	8.91	75.66
Rainfall (Inches)													
FY 1990	0.01	0.00	0.12	0.21	0.00	0.58	1.02	0.16	0.37	3.18	3.34	2 3.05	15.38
Pool Elevation (EOM)	3233.10	3234.90	3236.00	3237.40	3238.50	3239.00	3233.40	3231.30	3236.80	3230.40	3240.40	3236.90	
Maximum	3238.90	3234.90	3236.00	3237.40	3238.50	3239.00	3239.20	3233.40	3241.30	3236.80	3242.30	3240.40	
Minimum	3232.90	3233.10	3234.90	3236.00	3237.40	3238.50	3233.40	3224.40	3231.30	3230.40	3230.40	3236.50	
Pool Content (EOM) (1000 Ac-Ft)	5.35	6.59	7.46	8.70	9.78	10.30	5.54	4.36	8.15	3.96	11.85	8.24	

Data for compiling averages unavailable

COCHITI LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1910 thru 1990	49.01	54.32	48.73	41.55	47.46	81.11	138.68	267.93	200.62	85.17	57.26	44.35	1.116.20
FY 1990	33.66	26.67	36.30	38.53	35.30	52.52	60.80	98.26	63.09	64.64	50.79	55.90	616.49
Releases (1000 Ac-Ft)													
Avg 1975 thru 1990	39.24	50.65	55.77	51.22	60.53	88.32	141.43	218.75	197.86	130.06	64.66	48.31	1.146.80
FY 1990	31.71	18.46	45.26	38.59	34.96	52.56	60.17	98.07	62.84	62.80	50.32	54.04	609.81
Rainfall (Inches)													
Avg 1967 thru 1990	1.17	0.68	0.58	0.61	0.41	0.64	0.73	0.95	0.74	1.94	2.20	1.62	12.27
FY 1990	1.60	0.00	0.07	0.61	0.34	0.43	1.81	1.16	0.46	3.98	1.93	1.87	14.26
Pool Elevation (EOM)	5333.90	5339.81	5332.92	5332.85	5333.03	5332.58	5332.57	5332.00	5331.35	5332.27	5332.07	5333.13	
Maximum	5333.90	5339.81	5340.46	5332.89	5333.18	5333.08	5332.92	5332.92	5332.90	5333.06	5332.66	5333.75	
Minimum	5332.53	5334.11	5331.21	5332.47	5332.80	5332.58	5332.42	5331.91	5331.24	5331.36	5331.78	5331.54	
Pool Content (EOM) (1000 Ac-Ft)	52.19	60.09	50.94	50.85	51.08	50.52	50.51	49.82	49.[illegible]6	50.14	49.90	51.21	

RIO GRANDE BASIN

GALISTEO DAM

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1971 thru 1990													
FY 1990	INFLOW = OUTFLOW												
Releases (1000 Ac-Ft)													
Avg 1971 thru 1990	0.40	0.09	0.08	0.07	0.09	0.15	0.20	0.26	0.23	1.20	0.94	0.70	4.40
FY 1990	0.05	0.00	0.00	0.01	0.01	0.04	0.03	0.01	0.00	1.51	0.44	1.30	3.38
Rainfall (Inches)													
Avg 1971 thru 1990	1.09	0.42	0.38	0.46	0.56	0.47	0.72	0.80	0.58	1.59	1.67	1.39	10.32
FY 1990	1.22	0.00	0.15	0.68	0.66	0.73	1.05	0.33	0.15	2.98	1.86	3.58	13.39
Pool Elevation (EOM)	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	
Maximum	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	
Minimum	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	5496.00	
Pool Content (EOM) (1000 Ac-Ft)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

JEMEZ CANYON DAM

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1921 thru 1990	2.40	1.84	1.60	1.66	1.94	4.39	17.98	14.72	2.82	1.32	2.44	1.68	54.80
FY 1990	1.10	1.03	1.32	1.51	1.66	4.98	7.13	6.40	0.38	3.18	2.51	2.61	33.81
Releases (1000 Ac-Ft)													
Avg 1954 thru 1990	1.98	1.90	1.4[illegible]	1.56	1.74	3.99	10.89	12.20	5.88	2.91	2.79	1.52	48.76
FY 1990	1.14	0.17	1.83	1.33	1.67	4.76	6.91	6.33	0.46	2.60	2.56	1.27	31.03
Rainfall (Inches)													
Avg 1953 thru 1990	1.04	0.47	0.42	0.38	0.36	0.46	0.46	0.64	0.55	1.38	1.58	1.19	8.94
FY 1990	1.33	0.00	0.11	0.21	0.44	0.43	1.56	0.66	0.46	3.09	1.74	2.03	12.06
Pool Elevation (EOM)	5191.39	5191.85	5191.27	5191.26	5191.02	5190.75	5190.38	5189.62	5188.48	5188.20	5187.48	5188.10	
Maximum	5192.08	5191.85	5191.93	5191.31	5191.32	5191.20	5191.07	5190.58	5189.54	5190.07	5188.43	5188.10	
Minimum	5191.39	5191.40	5191.19	5191.12	5191.01	5190.75	5190.30	5189.62	5188.48	5188.14	5187.48	5187.00	
Pool Content (EOM) (1000 Ac-Ft)	2[illegible].49	23.05	22.35	22.34	22.05	21.73	21.29	20.40	19.11	18.79	18.00	18.68	

RIO GRANDE BASIN

SANTA ROSA LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 19[illegible] thru 1990	3.45	2.[illegible]4	1.73	1.70	2.03	4.44	8.40	17.22	15.27	8.98	13.68	[illegible].90	86.94
FY [illegible]	1.88	1.10	1.21	1.19	1.20	1.35	3.44	7.21	1.07	16.42	11.14	7.52	54.73
Releases (1000 Ac-Ft)													
Avg 1981 thru 1990	0.72	0.93	0.54	0.54	0.84	1.44	5.75	17.19	11.96	12.52	10.39	9.31	72.14
FY 1990	0.01	0.00	0.00	0.00	0.00	0.00	0.01	22.61	8.04	1.09	17.70	0.06	49.52
Rainfall (Inches)													
Avg 1981 thru 1990	1.51	0.87	0.63	0.50	0.49	0.54	0.86	1.47	1.86	2.03	3.36	[illegible].88	15.99
FY 1990	0.34	0.00	0.31	0.87	1.07	0.57	0.65	0.53	0.09	4.95	2.86	2.15	14.39
Pool Elevation (EOM)	4713.07	4713.63	4714.34	4715.01	4715.57	4715.99	4717.86	4704.12	4692.50	4711.39	4704.59	4711.44	
Maximum	4713.07	4713.63	4714.34	4715.01	4715.57	4715.99	4717.86	4720.21	4701.82	4712.18	4709.75	4711.44	
Minimum	4711.99	4713.08	4713.67	4714.36	4715.03	4715.61	4716.01	4704.12	46[illegible]0.66	4692.53	4689.95	4704.64	
Pool Content (EOM) (1000 Ac-Ft)	24.28	25.01	25.96	26.89	27.69	28.30	31.18	14.71	7.25	22.19	15.13	22.25	

SUMNER LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
FY 1990	Data Unavailable												
Releases (1000 Ac-Ft)													
FY 1990	5.50	0.04	0.05	1.00	1.51	3.[illegible]0	47.32	27.42	32.39	3.79	22.95	5.63	151.30
Rainfall (Inches)													
FY 1990	0.24	0.00	0.36	0.53	0.94	1.18	1.[illegible]1	[illegible].16	0.05	2.52	5.29	1.42	15.10
Pool Elevation (EOM)	4241.70	4245.40	4248.60	4250.90	4252.20	42[illegible]2.60	4252.30	4250.00	4237.00	4240.20	4242.20	4239.90	
Maximum	4243.20	4245.40	4248.60	4251.00	4252.20	4253.20	4252.90	4252.30	4250.00	4240.20	4242.20	4241.99	
Minimum	4241.70	4241.80	4245.50	4248.70	4250.70	[illegible]52.20	4252.30	4249.70	42[illegible]7.00	4234.00	4236.50	4239.90	
Pool Content (EOM) (1000 Ac-Ft)	14.16	18.76	23.57	27.63	30.15	30.96	30.35	25.78	9.68	7.71	9.20	7.53	

RIO GRANDE BASIN

TWO RIVERS RESERVCIR

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1981 thru 1990	1.05	0.87	0.82	0.88	0.69	0.85	1.07	0.84	0.47	0.41	1.40	1.80	11.15
FY 1990	0.00	0.00	1.11	1.38	0.30	0.00	0.00	0.00	0.00	0.42	1.90	2.10	7.21
Releases (1000 Ac-Ft)													
Avg 1981 thru 1990	1.05	0.86	0.81	0.89	0.69	0.85	1.07	0.84	0.43	0.43	1.40	1.[illegible]	11.13
FY 1990	0.00	0.00	1.11	1.38	0.30	0.00	0.00	0.00	0.00	0.42	1.87	2.09	7.18
Rainfall (Inches)													
Avg 1981 thru 1990	0.76	0.34	0.16	0.17	0.27	0.23	0.34	0.63	1.41	1.67	2.74	1.87	10.32
FY 1990	0.04	0.00	0.02	0.17	0.04	0.57	0.65	0.07	0.00	0.85	1.45	1.34	5.20
Pool Elevation (EOM)	0	0	0	0	0	0	0	0	0	0	0	0	
Maximum	0	0	0	0	0	0	0	0	0	0	0	0	
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	
Pool Content (EOM) (1000 Ac-Ft)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

SAN JUAN RIVER BASIN

NAVAJO DAM

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
FY 1990	26.00	8.68	6.50	8.09	10.16	26.25	68.76	139.22	145.02	71.74	52.11	48.50	611.03
Releases (1000 Ac-Ft)													
FY 1990	37.00	36.00	33.61	31.00	28.00	31.00	30.00	31.00	30.00	31.17	34.10	32.80	385.68
Rainfall (Inches)													
FY 1990	Data Unavailable												
Pool Elevation (EOM)	6055.41	6053.09	6050.76	6048.75	6047.14	6046.30	6048.24	6055.60	6061.83	6062.22	6061.28	6061.34	
Maximum	6057.30	6055.33	6053.01	6050.69	6048.69	6047.12	6048.24	6055.60	6062.03	6062.74	6062.12	6061.34	
Minimum	6055.41	6053.09	6050.76	6048.75	6047.14	6046.30	6046.14	6048.45	6055.75	6061.78	6061.28	6060.60	
Pool Content (EOM) (1000 Ac-Ft)	1287.00	1258.59	1230.89	1207.43	1188.91	1171.34	1201.53	1289.02	1367.28	1372.32	1360.21	1360.98	

Data for compiling averages unavailable

SECTION VIII - MINUTES OF MEETINGS

1. RESERVOIR CONTROL CENTER

2. ARKANSAS RIVER BASIN

1990 ANNUAL RESERVOIR CONTROL CENTER MEETING
SOUTHWESTERN DIVISION
CORPS OF ENGINEERS
31 OCTOBER - 1 NOVEMBER 1990

1st Day

I. WELCOME. The 1990 Annual Reservoir Control Center (RCC) meeting was held on 31 October - 1 November 1990 in the Southwestern Division office, Dallas, Texas. Mr. Charles Sullivan, Chief, Reservoir Control Center (RCC) welcomed the group. Mr. Sullivan informed the group that this would be the last meeting that he would attend as the RCC Chief in SWD. He has accepted the position in HQUSACE as Chief of the Water Control/Quality Section. Mr. Sullivan reminisced with the group by showing agenda topics of meetings several years in the past. He noted some topics were still slated to be discussed on the current agenda. Many accomplishments have been made, i.e., the implementation of the Water Control Data System (WCDS), systematic method of developing water control manuals, etc., but there are still a few hurdles to be overcome. Charlie expressed his appreciation to the group for their hard work, support, and cooperation given to water control activities while he has been the chief of the RCC. He also asked that the same be provided in future efforts and above all continue to work as a team. The agenda and attendance list are enclosures 1 and 2 respectively.

II. NEXRAD OVERVIEW. Mr. Steve Fortenberry led the discussion by giving an update on the NEXRAD implementation for the Corps. NOTE: The Southwestern Division was given the lead in coordinating Corps participation in NEXRAD and Mr. Fortenberry is the point of contact (POC). The National Weather Service (NWS) has approved 133 communication ports for the Corps' use. In mid July 1990, the Tulsa District issued a contract to Horizons Technology, Inc. (HTI) for development of software for a Principal User Processor Interactive Emulator (PUPIE). One of the stipulations in the contract was for HTI to have access to a Radar Product Generator (RPG) port at Norman, OK for testing the communications and software. This has been delayed due to hardware and software problems at the Norman site. This has also caused some delay in software development for the PUPIE. The acceptance of the Norman site is now not expected until about September 1991. Steve stated that two-day training sessions will be provided during the spring of the year for SWD personnel who will be involved in the interpretation of NEXRAD products (14) that the Corps will be receiving. He also suggested training in other technical areas and anticipates that other Corps divisions will require like training. Hydrologic Engineering Center (HEC) may provide the training with Steve as one of the instructors. Time frame for

HEC training sessions will probably be in June or July 1991 if the Norman, OK site goes into operation during the July thru September 1991 period.

Steve discussed the problems that are being experienced with the AFOS system and passed out products and graphics that should be available from AFOS. Mr. Sullivan met with Dr. Hutlow of the NWS to discuss the MOU between the Corps and the NWS and problems being experienced with the AFOS system. Dr. Hutlow agreed to work with the Corps to get problems resolved.

Mr. Clinton Word gave a brief discussion on the NEXRAD system's equipment, along with how the system should work and its cost. He reiterated the delay in acceptance of Norman site. Funding of the system is shared by all Corps division offices. To date, about 50 percent of the funds have been received. A complete list containing system equipment and associated cost will be provided at a later date. In closing, Clinton reminded the group that Mr. Steve Fortenberry will continue to be the Corps' point of contact for the system.

III. WATER CONTROL DATA SYSTEM. Mr. John Parks began his discussion by stating that the system was given a good workout during the spring floods and the system functioned well. However, some sites are reaching their capacities, i.e., the Dallas site. Completion of update items for the COOP plan was initiated in April. However, little or no progress made on the plan during the past year due to the spring floods. The plan is basically complete with the exception of a few items such as the back-up system. He has high expectations for completing the plan during the upcoming year.

The SWD master plan was completed during the past year. The plan recommended the use of workstations; but, recommendation has not received approval from HQUSACE. Indications are that an economic analysis will be required to support our recommendation. SWD has fought this concept in the past and if an economic analysis has to be made, the proposal will be to do the analysis on a division wide concept.

John reported that the WCDS Computer Life Cycle Replacement Work Group still has a list of questions to be answered, i.e., workstations, UNIX software, etc. Some questions are expected to be answered by on-going development. He stressed to the group the importance of SWD's development being compatible with other Corps offices. The life cycle of the current system is expected to end in 1994. He also discussed the need for SWD to form a team for the detail planning and specifications phase of the study. The team should be established as soon as possible because of the short time frame and the length of time required to

make necessary changes. After a group discussion, it was concluded that such a team is essential and the team should consist of technical people with a life span of about 4 years.

IV. RESERVOIR OPERATION AND POWER GENERATION REPORTS. Mr. Ed Westmeyer of Construction Operations explained why this item appeared on the agenda. He stated that a proposal has been made to computerize forms that are being used by hydropower personnel to report reservoir operations and power generations. During the process, it was found that the uses and methods of computing some of the data for the forms vary from district to district, therefore, forms should be reviewed for use and accuracy. After a lengthy group discussion, the Little Rock District was elected to provide an initial review and revision of forms and provide to other involved districts and division offices for concurrence.

2nd Day

V. DISTRICT STATUS REPORTS WITH MAJOR FOCUS ON THE SPRING FLOODS AND LESSONS LEARNED.

a. ALBUQUERQUE DISTRICT. Mr. Donald Gallegos reported that below normal snowmelt runoff and precipitation occurred during the past year. This was the third consecutive year below normal runoff conditions. As a result of drought conditions, reservoir irrigation storage was severely depleted in most projects. The district continued to work on Drought Contingency Plans (DCP) with two being approved by SWDO. John Martin and Trinidad reached a level 4 of severity. Other projects only reached levels 2 and 3. No requests for assistance or coordination were received during the drought period. The non-federal hydropower plant at Abiquiu began generating power during the year. Work continued on developing a real-time rainfall forecasting model in the Arkansas River Basin. The HEC is developing the model and is about 70 percent complete. Sediment activities included the adoption of new area-capacity tables for Two Rivers and Santa Rosa.

b. GALVESTON DISTRICT - Mr. Charles Scheffler said dry conditions existed above the two storage projects (Addicks and Barker) for the year; however, record flows occurred along the Trinity River below Livingston Lake. Two deviations were requested and approved during the year. In Mar 90 releases were made for the "Great Houston Rubber Ducky Race" which has become an annual event for the purpose of raising funds for charitable organizations. Also, in April releases were made for the "21st Annual Reeking Regatta" which is held by the Buffalo Bayou coalition. There were no sediment activities due to drought like conditions. The district had a 4 percent increase in their cooperative program with the U.S. Geological Survey.

c. FORT WORTH DISTRICT. Mr. Arnold Escobar led the discussion for the district. Nine of the 24 projects were visited for the purpose of discussing data exchange, operation procedures, and other related water control activities. Three engineers were sent to Lavon during the April-May 90 flood to supervise operation of the flood control gates in the event communications were to fail. Above normal rainfall occurred over most of the basins with major flooding occurring during April thru June 1990. The Trinity, Brazos, and Neches River Basins experiencing the greatest amount. Eight of the 24 projects established record lake levels, four exceeded top of flood control pool, three went over their uncontrolled spillways and three required surcharge operations. Arnold gave the following as lessons learned or concerns that were surfaced during the spring floods:

- Establish Reservoir Information Center

- Reevaluate Surcharge Operations

- Reduction in Channel Conveyance

- Encroachment into Flood Pool Easements

Automation of project weather stations was initiated during the year. Automated stations will utilize satellite telemetry to relay data to the district office. The target date for full implementation of the system is 1 Oct 91. Each station will be given a 60-day trial period where duel readings will be taken for calibration and verification of data. During the year construction of non-federal hydro plants was initiated at Ray Roberts and Lewisville. The city of Denton, TX is the licencee. Also, the federal plant (Robert D. Willis) at B. A. Steinhagen became operational.

d. LITTLE ROCK DISTRICT. Mr. Jim Proctor reported for the district. Above average rainfall was experienced over all river basins within the district. Although the first quarter of FY 90 was extremely dry, rainfall for the period from January through May 1990 was above av rage, which resulted in the flooding during May. Record pool eleva ions were set at Blue Mountain and Nimrod Lakes and system storage in the White River Basin established a new record for this time of the year. The May 1990 flood was the largest event experienced on the Arkansas River since the construction of the McClellan-Kerr navigation system.

During the past year the White River Coordinating Committee was formed. The committee is composed of representatives from 30 organizations and agencies in the states of Arkansas and Missouri. The purpose of the committee is to improve communication and understanding among various users of the White River. The first meeting was held in April 1990 with subsequent meetings to be held twice a year under the leadership of the District Com-

mander. Work on the White River System Regulation Plan was continued and a plan was selected. The plan is scheduled to be implemented by the end of FY 91. Tasks remaining are review of existing EIS, completing an environmental assessment, and coordination with other agencies and the general public.

D.O. problems were experienced at both Table Rock and Bull Shoals. It appears that procedures similar to ones for Table Rock will have to be established for Bull Shoals. An oxygen injection system was installed in 1989 at Table Rock. The system was not completed during period of low D.O.; therefore, only partially tested during 1989. The system was restarted in 1990 and was operational only briefly. Equipment failures have delayed full implementation of automatic system, however, the system is expected to be completely functional in the near future.

David D. Terry Lock and Dam was selected as the pilot project for the installation of an artificial intelligence (AI) program for the district's navigation system. The purpose of the system is to provide an expert information base for automation of spillway gate operations. The Corps' CERL is developing the program. The engineering for the present contract is scheduled to be complete in March 1991 and an installation contract is expected to be awarded not later than May 1991.

e. TULSA DISTRICT. Mr. Ross Copley stated that most of the flooding occurred in the Lower Red and Arkansas River Basins. March rains caused major flooding which caused several projects to be filled. Additionally, several projects reached record pool levels. During the flooding several deviations were requested to assist farming activities, to prevent levee breaches, etc. Even though reservoir systems were full, the projects still provided significant flood protection. Ross felt that flood operations went well due to better forecasting ability, flood activity coordination, etc.

VI. DROUGHT CONTINGENCY PLANS. Mr. Ralph Garland led the discussion by providing the status of Drought Contingency Plan (DCP) development. Plan review was severely hampered during the past year because of the spring flooding and his 4-month professional development assignment to HQUSACE. Mr. Garland is the primary reviewer of CESWD Plans. HQUSACE has issued guidance letters stating that all Corps Plans should be completed during FY 92. Also states that the General Accounting Office (GAO) is monitoring our progress, which adds more to the importance of accomplishing the FY 92 date. CESWD Plans are in various stages of development, but it is felt that Plan development can be accomplished by HQUSACE's deadline.

VII. WATER CONTROL MANUALS. Mr. Ralph Garland stated that manual schedules were not accomplished as anticipated for the past year. Again, the spring flooding had a major impact on the availability of manpower for manual development during non-flood periods. HQUSACE has delegated the responsibility to FOAs for maintaining the original signed Water Control Agreements and Water Control Diagrams. These documents convey how Section 7 Projects are operated. As a result of this decision, CESWDO by memorandum of 25 Oct 90 requested affected districts to review their files and report their findings by 21 Dec 90.

VIII. OTHER TOPICS.

a. STAGE REDUCTIONS. All agreed that in determining flood damage benefits, methods should be used to provide consistency in stage reduction calculations.

b. ENVIRONMENTAL CONCERNS. It was emphasized by CESWDO that any actions taken, i.e., operations for the Least Tern, that impact on project operations should have CESWDO's concurrence prior to implementing. A policy letter has been issued detailing these concerns.

IX. ADJOURN. The meeting was adjourned at 1130.

AGENDA

1990 RCC ANNUAL MEETING
SOUTHWESTERN DIVISION
CORPS OF ENGINEERS
31 October and 1 November 1990

1st Day

I. WELCOME

II. NEXRAD OVERVIEW

III. WATER CONTROL DATA SYSTEM (WCDS)

IV. RESERVOIR OPERATIONS AND POWER GENERATION REPORTS

2nd Day

V. DISTRICT STATUS REPORTS WITH MAJOR FOCUS ON THE SPRING FLOODS AND LESSONS LEARNED

VI. DROUGHT CONTINGENCY PLANS

VII. WATER CONTROL MANUALS

VIII. OTHER TOPICS

IX. ADJOURN

ENCL 1

1990 RCC MEETING
31 October - 1 November 1990

ATTENDANCE

ALBUQUERQUE DISTRICT	
Donald Gallegos	CESWA-ED-PC
FORT WORTH DISTRICT	
Douglas Perrin	CESWF-ED-HL
Robert Corby	CESWF-ED-HL
Arnold Escobar	CESWF-ED-HL
GALVESTON DISTRICT	
Charles Scheffler	CESWG-ED-HC
LITTLE ROCK DISTRICT	
James Proctor	CESWL-ED-HR
Loren Pope (Part-Time)	CESWL-ED-H
TULSA DISTRICT	
Ross Copley	CESWT-EC-HR
Clinton E. Word	CESWT-EC-HC
Carroll Scoggins	CESWT-EC-H
SOUTHWESTERN DIVISION	
Ralph E. Garland	CESWD-ED-WR
Charles Sullivan	CESWD-ED-WR
Cliff Victry	CESWD-ED-WR
John Parks	CESWD-ED-WR
David Brown	CESWD-ED-WA
Ron Hula	CESWD-ED-WH
Steve Fortenberry	CESWD-ED-WR
Ed Westmeyer (Part-Time)	CESWD-CO-O

MINUTES

Arkansas River Basin Coordinating Committee Meeting
1114 Commerce Street, Dallas, Texas
28 June 1990

1. The Arkansas River Basin Coordinating Committee meeting was held in the Southwestern Division office, Corps of Engineers, Dallas, Texas on 28 June 1990. A copy of the agenda is attached as enclosure 1. The meeting was attended by 48 people, which included 13 of 23 Committee members and 35 invited guests. A copy of the attendance list is attached as enclosure 2.

2. Brigadier General Robert C. Lee, Division Engineer, Southwestern Division, Corps of Engineers, and chairman of the committee, welcomed the group to the 4th meeting of the reconstituted Arkansas River Basin Coordinating Committee and introduced the attendees. He pointed out that the committee, of state and federal representatives who are concerned with the many uses within the basin, serves as an advisory committee to the Corps of Engineers in the development of operating plans for the System.

BG Lee said that an extract from the Arkansas River Basin Arkansas and Oklahoma Feasibility Report, (draft) dated March 1990 is included in the packets for the members. The report has not been certified in the Chief's office so the whole report is not ready to be released yet. The members will have an opportunity to comment on the full report when it is released.

3. Mr. Charles Sullivan, Chief, Reservoir Control Center, Water Management Division, Southwestern Division, Corps of Engineers, presented a review of the 1989/1990 operations of the basin projects. A copy of Mr. Sullivan's presentation is attached as enclosure 3.

4. Mr. Charles (Chuck) Stein, Acting Chief of the Project Reports Branch, Planning Division, Little Rock District presented a status report on the Arkansas River Basin, AR and OK, Feasibility Study. A copy of Mr Stein's presentation is attached as enclosure 4.

5. Mr. Chris Hicklin, Projects Report Branch, Planning Division, Little Rock District presented a report on the Montgomery Point Lock & Dam. A copy of Mr Hicklin's presentation is attached as enclosure 5.

6. Following these presentations, committee members were given the opportunity to address the group. Those committee members present made remarks appropriate to their areas of interest and expertise. A summary of these remarks are as follows:

a. Jim Barnett, Executive Director, Oklahoma Water Resources Board -- He emphasized three issues.

(1) The OWRB is disappointed that the Arkansas River Basin Feasibility study was not able to identify any new feasible multipurpose reservoir projects.

(2) The Board remains concerned about the ramifications of the Corps Headquarters' recent policy decision declaring no federal interest in the rehabilitation of existing flood control levees.

(3) The Board remains concerned that we have not been able to resolve the issue of the Corps utilizing flood control and conservation storage to enhance navigation in reservoirs where navigation is not an authorized purpose.

A written statement was submitted and is attached as enclosure 6.

b. Steve Lewis, Director, Oklahoma Department of Wildlife Conservation -- As the Corps go to the final plan he wants to be sure that fish and wildlife continue to be considered. Also, encourage the consideration of wetlands and waterfowl. Water quality should continue to be monitored.

c. Bob Price, Ark Soil Conservation Service (SCS) -- Mr. Price reported on Emergency Watershed Protection (EWP). On May 3 the SCS emergency response team was activated to help relieve threats to life and property from flooding, erosion,and widespread sediment deposits. As of June 25, 1990, the SCS has determined eligible assistance for 249 sites in 30 counties. He also reported on their study plans within the Illinois River Basin in northwest Arkansas and northeast Oklahoma and the Morrilton Flood Plain Management Study. A status update on the Upper Petit Jean Watershed project was presented. A copy of the written report is attached as enclosure 7.

d. Chuck Thomas, Oklahoma Soil Conservation Service (SCS) -- He reported on their continuing planning assistance to local sponsors on Brazil Creek Watershed in the Poteau River Basin. The SCS is working to improve water quality within the Arkansas basin by addressing non-point source pollution. Assistance is being provided and/or planned in four Hydrologic Unit Areas. A copy of the written report is attached as enclosure 8.

e. John Pearson, Ark-Oklahoma Port Operators Association -- Stated that they appreciate the Corps going through the planning process.

f. BMCM Charles Jones, U.S. Coast Guard -- Reported that on June 21 all of the buoys have been reset and most of the lights have been rebuilt. There are still 10 lights down. During this

flood 95 percent of the buoys were lost. The Coast Guard appreciates the assistance which was provided by the Corps of Engineers Little Rock District.

g. George Robbins, Southwestern Power Administration -- Stated that the year was above normal for power production. They have signed contracts with the Grand River Dam Authority on the addition of two units at Fort Gibson. Mr. Robbins suggested that we should continue to explore opportunities to improve power production. A copy of the written report is attached as enclosure 9.

h. Robert Portiss, Tulsa Port of Catoosa -- The Arkansas Basin Development Association (Colorado, Kansas, Oklahoma, Arkansas, & Missouri) has not had a full time executive director for 2 to 3 years. They are looking at a contractor to run the organization. He also mentioned that there are several reservoirs in the basin that are authorized but are not funded. If these were built it would help the flows. Noted that congress has directed the Sec of Transportation to look into the utilization of inland waterways for military transportation.

The port of Catoosa is the largest in the country with about 2,000 acres of land. They have identified an environmental problem involving fish kill in the port area. Spilled fertilizer in has been identified as a problem and procedures have initiated to reduce this during loading operations.

i. Jim Phillips, Arkansas Waterways Commission -- He raised several issues that are of a concern to the commission. Low water at the mouth of the navigation system is still the most critical issue however, high water is also a problem. Navigation wants the time high water is on them to be minimized. Mr. Phillips feels that the water can be evacuated quicker by using higher flow rates, and now is the time to solve this issue. He wants a 90 day crash study to tell what the damage below Van Buren would be and what the benefits to navigation would be. A written copy of this report is attached as enclosure 10.

j. Glen Cheatham, Oklahoma Department of Commerce -- Commented on the Montgomery Point study. He has reviewed the study to this point and is also concerned about the high water problems on the Arkansas.

k. Earl Smith, Arkansas Soil & Water Conservation Commission -- Commented on the cooperative sprit of the members during the feasibility study. He also expressed a desire to do something about the high water problems.

9. Conclusions.

a. Brigadier General Lee stated that the advice of the committee is greatly appreciated. He also stated that this was his last meeting and it was a privilege to serve as chairman. He strongly urges the members to continue supporting the committee meeting. He told the members to feel free to contact him any time.

b. The next meeting was tentatively set for the same time next year.

10. Meeting Adjourned.

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10 Enclosures

1. Agenda
2. Attendance List
3. Review of 1989/1990 Operations Presentation - by Mr. Charles Sullivan
4. In Progress Review - Arkansas River Basin, AR and OK, Feasibility Study Presentation - by Mr. Charles Stein
5. Report on Montgomery Point Lock & Dam - by Mr. Chris Hicklin
6. Written Comments - OK Water Resources Board
7. " " - AR Soil Conservation Service
8. " " - OK Soil Conservation Service
9. " " - Southwestern Power Administration
10. " " - Phillips, Arkansas Waterways Commission

Agenda
ARKANSAS RIVER BASIN COORDINATING COMMITTEE MEETING
Room 411, 1114 Commerce Street
Dallas, Texas
June 28, 1990

	TIME
REGISTRATION -	9:30-10:00
WELCOME - Brigadier General Lee - - - - - - - - - - - -	10:00
REVIEW OF 1989/1990 OPERATIONS- - - - - - - - - - - - - -	10:15
IN PROGRESS REVIEW - ARKANSAS RIVER BASIN, ARKANSAS & OKLAHOMA FEASIBILITY STUDY - - - - - - - - - - - - - - - - - - -	11:00
REPORT ON MONTGOMERY POINT LOCK DAM - - - - - - - - - - - -	11:45
REMARKS - Brigadier General Lee - - - - - - - - - - - - - -	12:15
- - - LUNCH - - -	12:30
COMMITTEE MEMBER REPORTS -	1:30
SUMMARY COMMENTS -	2:45
- - - ADJOURN - - -	3:00

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ATTENDANCE LIST
ARKANSAS RIVER BASIN COORDINATING COMMITTEE MEETING
28 JUNE 1990

MEMBERS

NAME	AGENCY
JAMES BARNETT	OKLAHOMA WATER RESOURCES BOARD OKLAHOMA CITY, OK
GLEN L. CHEATHAM Jr	OKLAHOMA DEPARTMENT OF COMMERCE TULSA, OK
BMCM CHARLES JONES	U.S. COAST GUARD SALLISAW, OK
BG ROBERT C. LEE	CORPS OF ENGINEERS DALLAS, TX
STEVE LEWIS	OKLAHOMA FISH & WILDLIFE COMMISSION OKLAHOMA CITY, OK
BARRY McKUIN	ARKANSAS BASIN ASSOCIATION LITTLE ROCK, AR
John C. Pearson	AR-OK PORT OPERATORS ASSOCIATION GUTHRIE, OK
Col JAMES PHILLIPS (USA Ret)	ARKANSAS WATERWAYS COMMISSION LITTLE ROCK, AR
ROBERT W. PORTISS	TULSA PORT OF CATOOSA CATOOSA, OK
ROBERT PRICE	SOIL CONSERVATION SERVICE ARKANSAS LITTLE ROCK, AR
GEORGE ROBBINS	SOUTHWESTERN POWER ADMINISTRATION TULSA, OK
EARL SMITH	ARKANSAS SOIL & WATER CONSERVATION COMMISSION LITTLE ROCK, AR

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MEMBERS Cont'd

NAME	AGENCY
CHARLES THOMAS	SOIL CONSERVATION SERVICE OKLAHOMA STILLWATER, OK

GUEST

NAME	AGENCY
CARMIE HENRY	SENATOR PRYOR'S OFFICE LITTLE ROCK, AR
CYNTHIA EDWARDS	SENATOR BUMPER'S OFFICE LITTLE ROCK, AR
GAYLAND FOUNTAIN	REPRESENTATIVE ANTHONY'S OFFICE PINE BLUFF, AR
MIKE MATHIS	OKLAHOMA WATER RESOURCES BOARD OKLAHOMA CITY, OK
LARRY BAX	CORPS OF ENGINEERS DALLAS, TX
RICHARD BELL	CORPS OF ENGINEERS DALLAS, TX
DONALD BRATTON	CORPS OF ENGINEERS LITTLE ROCK, AR
DAVE BURROUGH	CORPS OF ENGINEERS LITTLE ROCK, AR
Lu CHRISTIE	CORPS OF ENGINEERS DALLAS, TX
WILLIAM DeBUSK	CORPS OF ENGINEERS LITTLE ROCK, AR
ARTHUR D. DENYS	CORPS OF ENGINEERS DALLAS, TX
CHRIS HICKLIN	CORPS OF ENGINEERS LITTLE ROCK, AR

<u>GUEST</u>

NAME	AGENCY
LARRY HOGUE	CORPS OF ENGINEERS TULSA, OK
RON HULA	CORPS OF ENGINEERS DALLAS, TX
DAVID KANNADY	CORPS OF ENGINEERS TULSA, OK
TERRY KELLEY	CORPS OF ENGINEERS TULSA, OK
TOM KINCHELOE	CORPS OF ENGINEERS DALLAS, TX
GENE LILLY	CORPS OF ENGINEERS TULSA, OK
COL CHARLES C. McCLOSKEY III	CORPS OF ENGINEERS LITTLE ROCK, AR
NOAH NEW	CORPS OF ENGINEERS DALLAS, TX
LARRY NEWBOLT	CORPS OF ENGINEERS DALLAS, TX
JOHN PARKS	CORPS OF ENGINEERS DALLAS, TX
LOREN POPE	CORPS OF ENGINEERS LITTLE ROCK, AR
HOLLY REICKS	CORPS OF ENGINEERS LITTLE ROCK, AR
BURTON ROLFE	CORPS OF ENGINEERS DALLAS, TX
BARRY ROUGHT	CORPS OF ENGINEERS DALLAS, TX
COL FRANCIS L. SMITH	CORPS OF ENGINEERS TULSA, OK

GUEST

NAME	AGENCY
JERRY SMITH	CORPS OF ENGINEERS DALLAS, TX
CHARLES STEIN	CORPS OF ENGINEERS LITTLE ROCK, AR
CHARLES SULLIVAN	CORPS OF ENGINEERS DALLAS, TX
MING TSENG	CORPS OF ENGINEERS OCE, WASH DC
HECTOR VELA	CORPS OF ENGINEERS DALLAS, TX
CLIFF VICTRY	CORPS OF ENGINEERS DALLAS, TX
ESTUS WALKER	CORPS OF ENGINEERS LITTLE ROCK, AR
CLINTON WORD	CORPS OF ENGINEERS TULSA, OK